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[Founded in 1849 as the "Journal of Gas Lighting."]

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EDITORIAL NOTES.

Three Weeks!

"CRISIS" is the word which is being used in the daily papers in connection with the question of pay and conditions of work in the mining industry; and the position is unquestionably sufficiently serious to justify the term. It was expected that whatever proposals the Mining Association made on behalf of the coal owners would be rejected by the Miners' Federation; and this is the case. In considering those proposals, it is necessary to maintain a proper perspective. They have been designated "drastic" and "revolutionary." There is no call on our part to discuss whether or not they are so. Assuming both descriptions are correct, the fact that they are so is due to one thing, and one thing only, and that is the obstinacy of the Miners' Federation in refusing to join with the owners in asking Parliament to lengthen the seven-hour shift to eight hours; for it is only since the statutory seven-hour shift came into operation that the coal industry has drifted into a position which has ultimately placed other countries in a superior competitive state. If the Miners' Federation would only concede the hour per day, then the earnings of the workers would not be reduced, the production costs per ton would be lowered, and the industry would be lifted to an economic plane which would help it to recover its lost trade abroad. An impassionate review of the position shows conclusively that the Miners' Federation are responsible for the present impasse, and that their policy is more pay for no more work, which would simply drive the industry into worse case, to the detriment of the country, the industry, and the miners themselves. So far as they are concerned, there is already much unemployment and short-time working, which is in part due to the smaller requirement for British coal, and in part to the over-manning of the industry, owing to the influx of new hands during the war, and their full strength retention on the return of the old hands from the war.

The notice to terminate the present agreement expires at the end of the present month. There is already talk of "fighting." The preliminary fighting will be by negotiation in an attempt to effect an agreement—possibly by compromise; but if this does not come to pass, well then, it seems to us, there is only one grave alternative. But it is hoped that the miners themselves will bring some influence to bear upon their leaders, and show them that they are willing to help to apply the remedies to enable the industry to be restored to a healthy state. Unless this is done, the prospects are of an order upon which it is not pleasant to dwell. The notice to terminate the present agreement expiring at the end of the month, there are still three weeks for negotiating a new agreement, and, of course, it is quite open to the parties to prolong the period if they feel so disposed. We hope that during the period the Miners' Federation will accept the position that the state of the industry calls for adjustment of both wages rates and working conditions, for the two hang together if the daily earning power of the men is to be maintained. But at the moment the situation is that a delegate conference of the Miners' Federation last Friday rejected the owners' proposals. On the following day, representatives of the Federation met the Committees of other Trade Unions further to consider the formation of a new industrial alliance. A meeting has also been arranged with the Miners' International Committee. A special meeting of the General Council of the Trade Union Congress is to be held on Friday of this week to discuss the position of the miners. This programme all points to an investigation to ascertain the strength of a probable backing. Next Monday the Executive of the Miners' Federation will review the whole situation in the light of what transpires this week. The following day the annual conference of the Federation takes place at Scarborough; and it will deal exclusively with the wages position. Up to the present, the Federation have not made a single constructive suggestion to show how the production costs per ton of coal are to be reduced, in order to enable this country to compete with other coal-raising countries, and so restore prosperity to British coal. While the representatives of the miners have failed in this regard, and still want their constituents to have more money without contributing anything to better the economic conditions of the industry, they appear to look upon the holders of capital in the industry as nothing better than criminals for desiring, after the lean times they have had, to provide not a "guaranteed" return, but a return upon their capital.

As to the proposals, the owners' scheme provides for a continuation of the main principle of the agreements of 1921 and 1924 as to the allocation of a specified proportion of the net profits of the industry to wages. In order to simplify the process of ascertainments, they suggest that the division of the net proceeds shall be in the ratio of 87 p.ct. in wages and 13 p.ct. in profits to the colliery owners. The single percentage of 87 allocated to wages closely corresponds with the figure representing the combined effect of the two percentages in the current agreement. A National Board and Area Boards are suggested. The application of the percentages it is contemplated shall be applied to the jointly audited results in each coal area. The amount proposed to be subject to percentage division is the difference between total outgoings and receipts, after deduction of any provision made in any district to meet the cases of low-paid men. The coal owners believe that their proposals, while according to the workers in each district the fullest possible share in the proceeds, would enable the industry in every district to continue in operation in a state of efficiency, and to make the necessary provision for its normal development.

The attitude of the Miners' Federation towards the proposals is interesting. The resolution passed at the Delegates' Conference makes no acknowledgment of the parlous state of the industry, or of its incapacity, in present circumstances, for bearing fresh burdens, and maintaining a competitive place in the overseas markets. Instead, there is a want of frankness in the opening lines of their resolution. It acknowledges the receipt of the notice to terminate the general wages agreement at the end of this month; but it states that this has been given "with a view to a further attack upon the already inadequate wages of the mine workers, and of securing guaranteed profits to the owners." The Miners' Federation have overlooked the fact that intelligence exists outside their own executive body. The reasons they cannot accept the owners' proposals for a readjustment of wages are: The removal of the guaranteed minimum wages which are already (they should have said "in some cases") below the level of the present cost of living; the provision of guaranteed profits to the colliery owners irrespective of the rate of wages; the immediate great reduction in wages varying from 13·14 p.ct. to 47·91 p.ct. on basic rates; and the continued separation of mining opera-

tions from the profitable undertakings in connection with coking and bye-product recovery. These reasons ignore the fact that the proposals have been made through the impossibility of submitting more favourable ones in view of the unwillingness of the Federation to alter the hours of working, and as lowering the output costs per ton. They also disclose that while the Federation require a guaranteed wage for the workers, it would be a fearful strain upon their fair-mindedness to concede a guaranteed percentage of the profits to the capital which provides for employment, although that is not the meaning of the owners' proposal. Ludicrous to the last degree is the wish to include in the mining business the coking and bye-product works, with which (although attached to collieries) the miners have no more concern than they have with the gas and electricity undertakings which are customers of the mines. However, what the Federation submit as an alternative to the owners' scheme is that the mine workers are entitled to a wage rate not less than is necessary to meet the increase in the cost of living; and they urge all the districts to resist any offer which entails a departure from the national settlement. No indication is yet given as to what this alternative would mean for the different grades of workers; while the Mining Association's submitted percentages for the division of net profits do provide for the men 6·7 times more than the miners' share.

Of one thing the Miners' Federation are terribly afraid, and that is that there will be a break-away—that local agreements will be effected. The Unions have recently had a few shocks in this regard, by men and employees agreeing on terms to keep mines running instead of being closed down. Another significant incident was reported at the end of last week. Mr. Charles Markham, who has large colliery interests in Derbyshire and Yorkshire, is withdrawing from the Mining Association, and desires that his concerns shall now be regarded as free agents to deal with their men as is thought fit. It has also been intimated to the Yorkshire Miners' Association that a month's notice will be given to the men to terminate existing agreements. The decision, it is stated, will affect four large collieries in the Doncaster area, employing about 9000 men.

Naturally the chief interest of the gas industry is in the continuity of a reasonably-priced supply of coal. But the question which to-day concerns all gas undertakings is, What will happen in three weeks' time? No one can tell. All that can be hoped is that the burdens of the country are not going to be increased by strife, which will do no good, but much harm, to both coal miners and owners. There is now talk of Government intervention.

National Gas Service and Government Consideration.

WHEN regard is had to the present position of the gas industry, especially in relation to its service to the community, one cannot avoid being struck by the fact that all that is being done has been the result of its own efforts, without external aids. When current movements round about us are surveyed, it is seen how little consideration the industry receives from the national point of view; and yet probably of all industries that of gas supply deserves it most for its utilitarian work. Apart from what gas undertakings did during the war in contributing to one of the then primary necessities—high explosives—it was the very first industry to demonstrate how coal could be used with the highest efficiency and economy from the national point of view; and it continues to hold the front place. It was also the industry that inaugurated the provision of labour-saving fuel for the homes of the people; and to an extent which is known to be substantial, even if it defies computation, it has done much to ameliorate the pollution of the atmosphere by smoke arising from the combustion of raw coal. It was also the first to produce properties of coal upon which other industries have been founded. These services are in the nature of pioneer ones; and they have been highly successful and beneficial to the country. Yet there is by its Government small recognition of the advantages. The industry does not ask for consideration in any material form; but it does suggest that what it has done in the past, is doing in the present, and is prepared and must do in the future, should receive recognition to the end that its interests are not adversely affected by governmental preference in other directions. From what has already been said, and has still to be noted, it is within the right of the industry to claim that it has lived up to a standard of advance and service which is a credit not only to itself, but to the country. While the industry does not desire to applaud itself too much, it must tell of its actual achievements, so that others may know of them.

We are prompted to these remarks on reading an official précis of the evidence which Mr. D. Milne Watson, D.L., the President of the National Gas Council, gave last Wednesday before the Committee of Industry and Trade. It was pointed out by him how the industry has proved itself to be the chief conservator of the first national asset; and, although this is the case, the constituent parts of the gas-supply side of the industry are closely regulated by Acts of Parliament in respect of capital, prices, interest, and dividends, and, through this, their patrons are not only safeguarded, but are mutually concerned with the industry itself in the advance and protection of its interests. The point was also made in the evidence that, although gas is the primary product of the industry, the secondary products are of immense importance in their effect on the price of gas. At the moment, however, the secondary products are suffering from considerable depression through various causes. If the Government had considered the question of the co-ordination of the use of fuels so as to conserve the coal supply (instead of concentrating upon electrical power), coke would have reaped advantage. We are also reminded that the Government have not fostered to the extent they might have done the use of tar for road construction and surfacing. Their first consideration should be to advocate for road purposes the utilization of a home product made from British coals by British labour in works provided by British capital. In lieu of this, we see at the present juncture an inclination—pursuing the proneness to fritter away home interests—to favour for this purpose imported materials. Therefore, it is not surprising to find the President of the National Gas Council urging, on every appropriate occasion, that it should be the policy of the Government to promote the use of the British product—tar. It is an economic question of no mean importance, because of the cumulative effects—not only in respect of payments for an exotic product, but upon the interests of the large population served with gas by the industry. Then, again, another hindrance to the service of the industry (which, however, cannot be avoided) has been the lower price now obtained for sulphate of ammonia, owing to the large increase in the production of synthetic ammonia in Continental countries. But, notwithstanding these various impediments (including the payment of high wages) to maximum success in the work and service of the industry, the price of gas to-day is still only in the region of 50 p.ct. above pre-war charges. The secret of this ability to serve the community—despite high-priced materials and labour and lower demand and values for bye-products—at a price merely 50 p.ct. above pre-war charges, is traceable to the greater efficiency in the general working of the industry. During the last decade, and particularly in the years succeeding the war, the industry has made considerable progress in the promotion and realization of higher working standards; and, through technical education and research, the continuation of that progress is being assured. Furthermore, in respect of labour, the industry is a large employer; and it has set an example to other industries through the success of its co-partnership schemes. To this success, Mr. Milne Watson bore testimony; and excellent evidence was also given in this regard, on behalf of the pioneer South Metropolitan Company—by an Employee Director (Mr. H. T. Manley) and one of the employees (Mr. H. W. Middleton), both of whom testified to the material effects and influences which such schemes have in promoting unity, efficiency, and prosperity in an industrial undertaking.

On these various grounds alone—all representing benefits from the national point of view—the industry has a right to claim due consideration from the Government in all their dealings (other than those of universal incidence) which may in any way affect its well-being. We have spoken of the use of tar for road construction and surfacing purposes; present movements suggest that consideration favourable to the electricity industry, and detrimental to the gas industry, is likely to be given by the Government. This was another point to which Mr. Milne Watson called attention. While the gas industry has, through its own endeavours and resources, worked to higher efficiencies and service, the Government seem to be possessed of the idea that its rival

industry—electricity—requires in some form their aid to promote its advance. Fundamentally and actually, it needs no such thing; and certainly one cannot regard it as a duty of the Government to utilize its power in an indiscriminate manner, so that presumed advantage on the one hand is accompanied by definite injury on the other. The gas industry does not look at this matter from any narrow point of view. It has always recognized that electricity has, in addition to traction, many advantages in the service of the community. As a matter of fact, so catholic is the industry in its views that it advocates and utilizes in its own operations electricity when that is the best agent to be employed for a particular purpose. The same will happen in connection with low-temperature carbonization. Should it ever be proved that it can be made a commercial success, the gas industry will not hesitate to adopt it. At the present time there has been no proof that it would be to the interests either of the industry or of the large community it serves to introduce the process into its manufacturing system. Of this, those guiding the technical destinies of the industry are the best judges. The evidence laid on behalf of the gas industry before the Committee of Industry and Trade will, we hope, give enlightenment where apparently it is very much required.

Bitumen or Tar.

WE were not aware that Mr. W. J. Hadfield, the City Surveyor of Sheffield, was such a prompt and ardent reader of the "JOURNAL" that an article dealing with bitumen and tar, and something Sir Henry Maybury is reported to have said, which appeared in our issue for June 17 [p. 839], and could not have been available in Sheffield until the following day, had been perused by him, and a letter typed and sent to the "Surveyor" for publication on June 22. But so it was; and to tell the truth, we are rather interested in the intervention of Mr. Hadfield in this matter with an alacrity which does him (shall we say?) infinite credit. Not knowing that he was so keenly interested in the "JOURNAL," we might perhaps be pardoned for thinking that he had his attention called to the matter. If that thought is correct, the question we are inclined to ask is, "By whom?" However, it is unnecessary to make guesses. What at the moment concerns us is the material of which his letter to the "Surveyor" is composed. But we should like to say, by way of further preface, that we should have imagined that to most men, when writing a letter dealing with an article in the "JOURNAL," courtesy would have dictated the addressing of it to us for first publication, though it has to be acknowledged that Mr. Hadfield did the next correct thing by posting a copy of it to us. Anyway, sending the letter to the "Surveyor" was, it may be surmised, intended to secure for bitumen a free advertisement among our friends the road surveyors. We know of no other reason.

The letter says our article attacked Sir Henry Maybury as an advocate of foreign bitumen as against home-produced tar. It was not Sir Henry who was attacked, but his advocacy, truly stated, "of foreign bitumen as against home-produced tar." Two further points are made by Mr. Hadfield. The first is: Is it supposed that the hundreds of engineers who during recent years have gone in for bitumen have done so without considering which is the best and most economical material? And the second refers to the large fluctuations in the price of tar since 1914, which have done much to kill "the goose that had been laying the golden eggs." The letter is weak in view of facts—published and unpublished. However, we will only deal with the matter generally. The complaint as to the use of imported bitumen in place of home-made tar was not made during a period when the law of supply and demand placed tar in an abnormal position; and the highest prices mentioned by Mr. Hadfield were not anything like those that were being realized for crude tar by gas-works which are not distillers. It is unnecessary, however, to discuss past prices. The prices that matter are those ruling to-day, and those that are likely to obtain in future. Prices to-day are of a totally different order from those of two or three years since; and it is to-day that complaint is made as to the advocacy of imported bitumen. It was during the tar prices of the present that Sir Henry Maybury made the reputed depreciatory remark of tar against which Mr. Milne Watson so very rightly protested at the Institution luncheon; and it was as recently as Feb. 16 last that "Circular No. 220 (Roads)" was issued by the Ministry of Transport. Current prices are no bar to the use of the home-produced commodity.

Regarding the point as to hundreds of engineers having, during recent years, adopted bitumen, and the question as to whether they would have made the change "without considering very carefully which was the best and most economical material," it is not sufficient simply to "consider" the two materials. It is necessary to carry out tests. Can Mr. Hadfield supply any information as to the life of a bitumen road? Bitumen has not been in use sufficiently long to enable any definite statement to be made that it is superior to tar. There is ample evidence, however, of the corrugating effect of a bitumen surface on roads bearing heavy traffic; and the new arterial roads described by the daily Press as "death traps" are an appalling example of the effect of using bitumen surfacing. Possibly Mr. Hadfield may have had these arterial roads in mind when he stated: "Everyone concerned, including the gas and tar "interests, knows that bitumen is serving a purpose to-day "which can never be served by tar."

If the Germans or the French were faced with the problem, would they not do their utmost to encourage the use of a home-produced material, instead of increasing the adverse balance of trade by importing foreign substitutes? Would anybody really interested in the greatest use being made of home-produced substances issue a circular such as the one already referred to—No. 220 (Roads)—and send it to the Clerk of every Highway Authority in England, Scotland, and Wales? The mileage of roads draining directly into fishing streams does not amount to more than 4 p.ct. of the total; and it was drainings from roads of this character alone that the Joint Departmental Committee considered might be harmful to fish-life. Moreover, the object of the circular appears to be to bring the findings of the Committee to the notice of those local authorities who "do not apparently fully appreciate the risk of damage to freshwater fisheries by washings from tarred road surfaces." Are the Corporation of the City of London and the Metropolitan Boroughs of (say) Shoreditch and Stepney, vitally concerned with the preservation of fish-life? Commercial patriotism does not appear to be any more marked in highway engineers than in certain other sections of the community. To welcome any foreign material in preference to a home-produced article is a weakness from which some highway engineers do not appear to be immune. The fact remains that a road properly constructed with a suitable tar will give as good a surface as any road in existence.

It is hoped that the Ministry of Transport, if the Roads Improvement Bill becomes law, will lose no time in carrying out the experiments upon road surfaces which that measure authorizes them to conduct. The craze for foreign materials may then perhaps abate.

The Coke Competition Papers.

"WHO are going to be the winners in the Coke Competition?" "Who is the author of the *magnum opus* in Section I.?" These and similar questions have suggested themselves since June 30; but as the date for the reception of papers has been extended to July 31, a little time beyond that date will have to elapse before even the Adjudicating Committee will be in a position to announce their decision. The questions, however, show a lively and inquisitive interest in the matter, and that interest will grow until the names of the winners are published, and then will be continued until the successful papers are printed, read, and digested. This we can already promise, that certain of the papers are going to be influential in promoting experiment and interest in the subject of coke; and we think it may at once be said that the industry will in the event acknowledge their indebtedness to the Woodall-Duckham Companies for making a competition possible in relation to such a dominating subject as coke is to-day. We may take this early opportunity of pleading, in the name of the Adjudicating Committee, for a little patience in respect of their decisions after the turn of this month. They are not going to deal with their accepted trust in any perfunctory manner. Already close upon fifty papers have been received—some of them extensive ones. The stamps on the covers show that the bulk of them are of British origin; others are from the Continent; the United States are represented, and one postmark is Cana-

dian. Probably, in the result, there will be rather more than fifty papers. There are three members of the Adjudicating Committee. Each paper will therefore have three separate readings, before the members finally meet to pronounce judgment upon them. The holiday season has commenced; and even the members of the Adjudicating Committee consider they are entitled to a brief spell of relaxation. Apart from this, no time will be lost, though the Committee will decline to be hurried, in making final determination. To the contributors it is due that the examination (which has begun) of their papers shall be thorough. To the gas industry, we are confident the result of the competition will be highly advantageous.

Subsidies.

As taxpayers we are all individually and collectively interested in the question of Government subsidies to industry. The gas industry has been forced to make it a matter of very intimate concern during recent times—not because anything definite has yet been promised in connection with the subsidizing of the electricity industry, but because there have been rumours and oblique statements which have suggested that something of the kind may be, or has been, in the mind of the Government. In view of this, it was just as well for the gas industry to take early opportunities of protesting against anything being done in that direction; and among other industrialists the industry has very strong support for its attitude. What has been said on the one hand is that the Government, in connection with their reorganizing scheme, desired to "assist" the electricity industry. The word "assist" may be applied in several ways, and one of the applications could have a financial tendency, and even substantial materialization. On the other hand, there have been statements that the Government have no intention of rendering monetary assistance; and the same thing has been said of coal by Mr. Chamberlain. He was asked, in the House of Commons the other night, whether, in view of remarks which had been made by the Prime Minister regarding subsidies, the Government would consider a subsidy for the coal industry. Mr. Chamberlain's answer was the laconic one, "No, Sir."

The subsidizing observations of the Prime Minister were made during the unemployment debate on Monday of last week. In all such debates, it is the custom of modern times to introduce electricity, which shows how hard pressed the Government are in respect of initiative and projects for the relief of unemployment. Nothing will relieve it other than the amelioration of repressive conditions which have no association with power—electrical or otherwise. However, Mr. Baldwin stated that the Government had had a "practical" electricity scheme worked out for them. How he knows it is a "practical" scheme is not stated. The word may have slipped in unintentionally; many politicians make slips when dealing with technical matters of which they have little or no knowledge. As a matter of fact, the Prime Minister informed the House that the scheme is being examined by a strong Committee. From what we remember, the strength of the Committee lies in a political direction rather than in a technical one. However, if the Committee report that the scheme is "practicable," the necessary steps, the Premier says, will be taken to bring it into existence, and to pass whatever legislation may be necessary to enable this to be done. From his own showing, the electricity industry is not in want of any assistance from the Government—legislative, financial, or otherwise. He stated that the industry itself is expending £250,000 a year on research. An industry which can afford to spend that sum on research can well look after itself in respect of both development and finance. There is no question that the research the industry is itself carrying on is far more informative to it than any research which has been undertaken by the Government with a view to political interference in its affairs. The philosophic remark also appears in the speech of the Prime Minister that victory will in the long run go to the nation which can most efficiently and securely harness science to its industry. With that we fully agree. But the Government themselves, though well equipped with pretty epigrams as to research and science, do not appear to have made a very broad survey of what they are proposing to do in the matter of power. Had they instituted a properly organized research into the power and heat problems of the country generally, they would have attacked the matter from a point of view which would have been of immense national value. But they have persistently refused to go beyond the limitations of the outlook of their predecessors.

We come to the point as to subsidies. The Prime Minister thinks it may be that the time has come when, to give a stimulus to specially distressed industries, it may be desirable to take steps that would not or could not have been taken until unemployment had lasted for so long as it has done. Among "specially distressed" industries that of electricity supply is not numbered. Mr. Baldwin thinks it would be useful if the House would examine and consider whether by any form of subsidy it may be possible to give that stimulus in the regions of those industries which at the moment are beaten down into a position of helplessness. The electricity industry is not by any means in a helpless position. On the contrary, it is in a state of great activity. Its capital requirements are easily met, and the dividends private enterprise in the industry is able to pay are such as to make the mouths water of the share and stock holders in many other industries—the gas industry among them. However, the Prime Minister confesses that, in subsidizing, the difficulties are great, and may be insuperable. This means that the matter is very much up in the clouds, that the Government have no settled policy in connection with it, and that it is simply something which is in their minds. But how fast it will grow there, if there is no effective resistance, cannot be gauged.

The references of the Premier to subsidies appear to be very much of the nature of kite-flying. We hope it will bring to the Government very definite views from highly qualified quarters. Anyway, they had better have a care. Subsidies would be a burden on the taxpayer. Industries and those relying upon industries for their livelihood are in the aggregate the largest taxpayers; and subsidies for some industries must mean increased taxation generally for industry, which needs all the relief from taxation it can get. Subsidies would simply make the general burden heavier, in order to improve the condition of the few. And any beginning in subvention to industry from the national exchequer would mean opening the door to applications from all over the country. That would be so even though industrialists are largely against a subsidy policy. It would be much better if the Government would refrain from continuing to tinker about with industrial matters, and not impose upon industry additional burdens. Industry has every incentive to work out its own salvation; and it has the knowledge which the Government operating in political regions cannot possess.

Colour of Gasholders.

No doubt greater public interest than before is being taken in the appearance of structures and buildings; and there is a more general desire nowadays to have even things of the severely utilitarian order present as artistic an appearance as possible, so long as the more ornate character does not involve a substantially increased expenditure. The tendency must have approval. Now it appears people are getting tired of seeing gasholders of an almost universal colour. They are not regarded as things of beauty at any time or by anybody save the engineer, and even engineers do not show any visible rapture or fall down and worship them when they meet their eyes. They may admire the structural features, and that is all. However, gasholders are things which are tolerated for their beneficent services to mankind; but there are people—the good people of Honley, for example—who think they should be made as attractive as possible in respect of colour. Apparently the members of the District Council do not approve of the facial parts of gasholders being rouged. They have therefore been giving consideration to the question of the colour of their new holder. A newspaper cutting before us does not show whether or not they discussed the question of the wearing properties of different paints in the circumstances of use of a gasholder; sightliness appeared to be the only basis of consideration. The suggestions were varied. Some wanted the top lift to be painted light green, so as to have an appropriate blend with the sky background. Evidently, there were objections to that. However, sober and solemn reflection and discussion led to the final choice of "a pleasant dark green." We hope this will do something to remove any offence to the

artistic susceptibilities of the people of Honley, which the new holder might have given if painted of the usual colour. If there is a Socialist element in Honley, there may be partial disapproval of the change.

A Low-Temperature Government.

Among the things which have exercised a spell over the Government is low-temperature carbonization. The fascination has reached such a length that the Prime Minister says that if experiments at the Fuel Research Station justify it, the Government will consider erecting a plant upon a commercial scale to help in the development of the system. But, although "remarkable" results have been achieved on the laboratory scale, the time, Mr. Baldwin admits, has not yet come when a commercial process has been devised. In view of this, we wonder why the Government even entertain the thought that the matter is of such national importance that it should be within their province to do something which is far better left to private enterprise. The coal industry, railways, road transport, the provisioning of the country, water, gas, electricity, and all the great industries by which the country lives were placed on a commercial footing by private enterprise, and not by the Government experimenting with them on a commercial scale. It seems that the Government want to do something, but they do not know exactly what. So far, they have been unfortunate in their choice of subjects—electricity and low-temperature carbonization; but it is difficult to make them realize it.

Ironmongers and Gas-Fittings.

Our friend "The Ironmonger" is somewhat displeased with Mr. H. W. Price, who, at a recent meeting of the Midland Gas Salesmen's Circle, referred to ironmongers as the enemy within the gates. Unjust and untrue (our contemporary holds) is the implication that ironmongers habitually stock faulty, leaking pendants and ill-made brackets. We are afraid it is not generally true that it is proverbial that the ironmonger's besetting fault—if it be a fault—is to cling rather to the more expensive and better-made goods, and to disregard the chances of turnover possible with the lighter and cheaper wares. The propensity of ironmongers is mixed in this regard. We have in mind shops where the best of gas fittings and appliances are on view; we have seen in other shops very indifferent goods—some of the gimcrack order, which are supposed to economize gas, and do nothing of the kind. This is not pleasing. We admit the influence of ironmongers, and that their regard is something worth having; but we do wish some of them had a better technical knowledge as to what in gas appliances helps to efficiency and good reputation.

Electrical Sliding-Scale.

It may be recollected that in connection with the electricity reorganization scheme for London, a sliding-scale of prices and dividends is to be applied to the companies. To fix the standard prices for the various companies will naturally entail a considerable amount of investigation. In drawing-up the sliding-scale the services of Mr. William Cash, F.C.A., were sought; and his large experience of the sliding-scale system in the gas industry was very valuable. Now we see he has been asked by the London County Council to assist in the work of arriving at the standard prices in consultation with the Council's officers, and with Mr. J. H. Rider as the electrical engineering expert.

Summer Time.

Notwithstanding the congested state of the Parliamentary programme, the Government are hoping to get the Summer Time Bill through Parliament this session, so that summer time may end on the first Saturday in October, instead of on Sept. 19. Delay has been caused through inability to reach an agreement with the agricultural opponents; and therefore the matter will have to be left to the decision of the House. The Government have set apart July 17 for the report stage and third reading.

Pensions Bill.

The Federation of British Industries have been carefully considering the views of manufacturers on the Widows, Orphans, and Old-Age Contributory Pensions Bill, 1925, as ascertained at a series of meetings held throughout the country, with the result that they have addressed some interesting considerations to the Government. General alarm has been created by the proposal of the Government to add at the present moment to the colossal burden of direct and indirect contributions to social services which are already borne by industry. The expenditure on social services has risen from £63,000,000 in 1910-11 to £262,000,000 (excluding war pensions) in 1922-23—equivalent to the yield of an income-tax of 5s. in the pound. Of this expenditure a very high proportion falls on industry, not only in the form of taxation, but also as a direct item in costs in direct contributions and local rating. There can be no question that this is a very serious factor in the present high cost of production, which is retarding the recovery of trade and employment. The additions now proposed will make the total combined contributions from employer, workman, and State 4s. 0½d. per week per adult male employed. Such a burden under present trade conditions must be highly detrimental to all industries, and may well involve actual disaster to the trades which are exposed to the full force of foreign competition. The cost will fall with disproportionate severity upon industry as compared with other sections of the community, since the number of employees in industry is many times greater in relation to turnover than in wholesale or retail commerce, finance, or the professions. There consequently appears to be no justification on either economic or equitable grounds for the course proposed by the Government.

PERSONAL.

Mr. G. P. Mitchell, Engineer and Manager of the Blackburn Gas Department, is making favourable progress after his recent operation.

Mr. F. G. Ambler, formerly Works Manager of the Swansea Gas Light Company's Morriston Works, has been appointed Resident Manager of the Aldershot Gas, Water, and District Lighting Company's Ash Road Works.

Mr. B. Arnold, the Engineer, Manager, and Secretary of the Knottingley Gas Company, who has been a member of Knottingley Urban District Council for twenty years, has been further honoured by being elected Chairman this year for the third time.

To succeed Mr. Ollis as Chief Officer of the Public Control Department of the London County Council, the General Purposes Committee hae selected Mr. William Joseph O'Donnell, at present Chief Assistant. Mr. O'Donnell entered the Council's service in 1890, and has held his present position since 1906.

At the annual congregation of the University of Liverpool, held at St. George's Hall, on July 4, the degree of B.A. (Honours) was conferred on Miss Marian G. Gray, who was placed in the First Class in the School of English Literature. Miss Gray is the daughter of Mr. J. A. Gray, Engineer and Manager of the Ashton-in-Makerfield Gas-Works.

LEEDS UNIVERSITY.

Degrees in Gas Engineering.

The following degrees and post-graduate diplomas have been awarded by the University of Leeds for the year 1925 in the subject of gas engineering:

M.Sc. Degree.—C. B. Marson, B.Sc. (Gas Research Fellow).

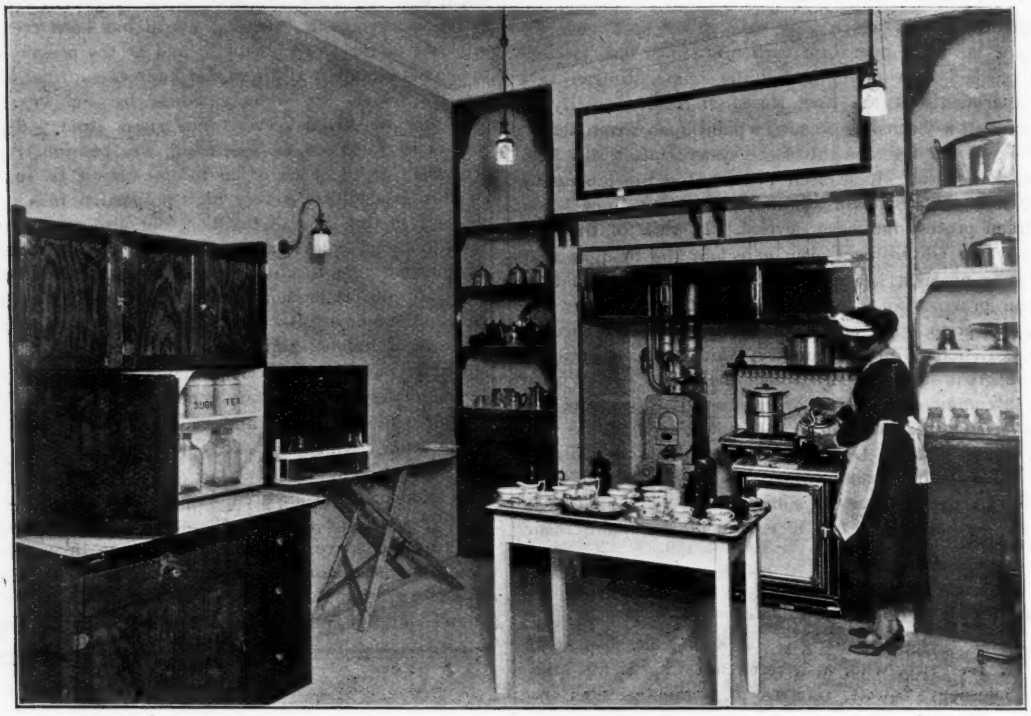
B.Sc. Degree.—A. G. Grant (Corbet-Woodall Scholar) and W. H. Blackburn.

Post-Graduate Diplomas.—Margaret F. Eurich, B.Sc. (London), C. E. Sanderson, B.Sc. (Leeds), and F. C. Ferguson, B.Sc. (London).

Testing of Fittings.—A fitting-testing machine designed and manufactured by the Southern California Gas Company in their own shops has been described in the "Gas News." The machine forces air under pressure into the fittings being tested while they are immersed in water, to ascertain that they have no flaws. It is used to prove fittings up to 3 in.; and a larger machine will be made to handle work above this size. Simplicity of operation is claimed on behalf of the machine.

THE GAS EXHIBIT AT WEMBLEY.

FURTHER VIEWS.



MODEL ALL-GAS KITCHEN SUITABLE FOR A GOOD-SIZED HOUSE.

With gas cooker and combined gas and coke heated hot water circulator. The parlour maid is seen preparing the teas served to members of the Society of Women Journalists and their friends in the Club Room of the Society in the Gas Exhibit.

The Parlour-Kitchen in the Chauffeur's Quarters.

With gas cooker, gas wash-copper, and gas fire.

The Motor Section of the Gas Exhibit.

Showing various gas heated appliances (furnaces, blow-pipes, &c.), used in the manufacture of motor cars. The powerful gas-lamps employed to light the scenery at the back of the Exhibit are mounted on models of the well-known National Benzole Mixture pumps.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

July 13-18.—SOCIETY OF CHEMICAL INDUSTRY.—Annual meeting at Leeds.

July 15.—INSTITUTION OF GAS ENGINEERS.—10.30, meeting of the Emergency Committee; 11.15, meeting of the Finance Committee; 11.45, Council meeting.

July 17.—INSTITUTION OF CHEMICAL ENGINEERS.—Annual meeting at the Philosophical Hall, Leeds.

July 18.—WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.—Visit of members and their friends to Porthcawl.

July 20-25.—ROYAL SANITARY INSTITUTE.—Congress at Edinburgh. H.R.H. the Duke of York has accepted the Hon. Presidentship of this Congress.

July 25.—MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.—Visit of members and their ladies to Lytham-St. Annes. During the morning the members will inspect the new gas-works at Eastham.

Sept. 15-17.—IRISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Belfast.

Oct. 19-21.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Conference and General Meeting in Plymouth.

ELECTRICITY SUPPLY MEMORANDA.

THE nebulous position of the Government electricity development schemes is causing great vexation in the electricity supply industry. In most sources of information we find complaint of this, and speculation as to where the industry is being led by the politicians. There is also an obvious dislike of the Government plan of appointing Committee after Committee to guide them, as they seem to think, into the correct paths; but with the consistency which has marked all political proceedings upon this question, the Committees that are appointed are not constituted as they should be to put the Government upon the correct road. In the annual report of the Council of the Incorporated Municipal Electrical Association, expression is given to the grave uncertainty that exists in regard to the future, and the responsibilities of existing electrical undertakings; and it is submitted that, until these are clearly defined, the latter cannot adopt a proper forward policy. It is possible that, when the ideas of the Government are clearly defined in a draft Bill, there may still be hesitation in adopting a forward policy, as we cannot help thinking that all the investigation, committee work, and secrecy must portend that the Government are intending to compel not a few undertakings to do those things which they would rather not do. We may, of course, be mistaken. The report states that the uncertainty specially arises in connection with the future of generation, the exact areas in which the undertakings are to provide an adequate supply, main transmission, and distribution, and whether they are to remain as a single entity for (1) generation, (2) transmission, and (3) distribution. Another direction in which progress cannot be made with security is the lay-out of distribution systems. This cannot be properly taken in hand until the ultimate area of supply has been defined. This seems to us to be a matter for the undertakings themselves rather than for the Government in a general scheme. Another point appears to be a selfish one, in these times when industries have to seek places of abode and methods of operation which will give them the benefit of economies. The report points out that extensions of the supply of electricity to outlying areas may have a harmful effect on the revenue from the rates in some districts, owing to the tendency for industries to be established, and for new houses and shops to be built, in districts where the rates are low. Nevertheless, it is urged that the Electricity Commissioners should proceed with the provisional delimitation of districts with all speed. It is also suggested in the report that every scheme receiving Government help should provide that the largest possible financial assistance should be rendered in the initial stages, and that it should be automatically reduced year by year as the income derivable therefrom becomes larger. It is considered that the guarantee of 20 p.ct. on the outlay incurred in giving a supply under section 27 of the Electric Lighting Act of 1899 is not large enough. The electrical people can never be charged with not opening their mouths wide enough.

Uncertainty and Desires.

Selling, Hiring, and Wiring.

The municipalities dearly want to get powers to sell and deal in electrical apparatus and to carry out wiring, instead of being limited by consideration for the local contractors, who have become so firmly established that they are a power in the industry, and cannot easily be deposed; and they are tenacious fighters in local Councils, in Parliament, and (if necessary) in the Law Courts. At the annual meeting of the Incorporated Municipal Electrical Association, a resolution was moved by Mr. Councillor W. H. Thickett, of Grimsby, which proposed to instruct the Council to take steps to secure legislation which would give full wiring powers to all municipalities. There was a sharp discussion on the subject, punctuated by various amendments; but this is what was eventually agreed: "That this Association consider the advisability of initiating legislation, giving powers to municipal electricity undertakings to sell and instal, on the hire-purchase system or otherwise, electrical apparatus—such as cookers, stoves, &c.—and also powers enabling such undertakings to finance and carry out, through wiring contractors or otherwise, wiring installations, and to charge a rent in respect of such wiring installations, or recover the cost thereof on the hire-purchase system or otherwise." It is seen that at present only the advisability of initiating legislation for these purposes is to be considered. The Council received no mandate to take definite steps. If there is a decision to proceed, the contractors will, in connection with wiring installations, concentrate pretty heavily on the words "or otherwise," and will do their best to insist that there shall be no poaching on their territory.

Is there a Lack of Business Energy?

In a paper by Mr. Councillor Thickett, the question was asked "Are supply undertakings doing their utmost to develop the demand for electricity?" No doubt remained at the close of the paper that he does not think they are. His dissatisfaction with the consumption of electricity per head of the population in this country follows the old fallacy that, in a coal-raising country, the conditions are comparable with countries that have no coal-fields, but have abundant water power for generating current. It is noticed that the author recognizes that the water-power countries are favoured—true in connection with water power, but not coal, which is vastly more important from the national point of view. Another difference is the relatively cheap gas supplies and gas apparatus in this country, compared with the water-power "favoured" countries. When the whole of the conditions are surveyed, it cannot be asserted that in respect of electricity this country is, comparatively, doing at all badly. It is on such evidence—which we think unreliable in view of the fact that dissimilar conditions vitiate comparison—that Mr. Thickett has formed the opinion that supply undertakings are not doing their utmost to develop the demand for electricity. It would be interesting to know how Grimsby stands in relation to the consumption per head of its population. But as to the reforms suggested by the author. One is the need for closer contact between the industry and the public. Then he confesses that obstacles to sales development include cost of appliances, lack of knowledge by consumers, and the cost of electricity in certain districts. It must be obvious, from the most casual glance at the facts, that the cost of electrical appliances of equal capacity and quality to gas appliances must always be higher than that of the latter. Consider, too, the details of the wiring equipment; this must also be dearer than gas piping. As to the want of knowledge by consumers, the "E.D.A." has been working vigorously; and if local propaganda is not all it should be, it is the fault of the undertaking concerned. Another hampering fact is that apparatus is either not good enough or too dear. In the opinion of the author, there is strong need for research and standardization, and that is generally conceded. A surprising confession from an electrical advocate is that there are probably less than fifty undertakings offering electricity at rates which make electric cooking "easily competitive" with gas. We have never found a case yet where, upon examination of the data, the "easily competitive" holds good.

Women Take a Hand.

One section of the annual meeting of the Incorporated Municipal Electrical Association was devoted to the work of women in connection with the electricity supply industry. As mentioned on a former occasion in the "Memoranda," an Electrical Association for Women has been formed, the object of which is the promotion of the wider use of electricity in the service of women. The reader of one of the papers was Alderman (Mrs.) S. E. Hammer; and in it she showed herself a strong advocate of young women being educated in electrical cooking at places where they are taught domestic subjects—at cookery centres, secondary schools, and polytechnics. From inquiries which have been made, it is found that several electrical authorities have already installed cookers in domestic science centres, and others are considering the advisability of doing so. According to the paper, the experiment has been highly successful. For the past ten years, an electrical cooking equipment has been in use at the Brighton Technical College. Mrs. Hammer points out that not only is a knowledge of electric cooking valuable to young women for private domestic purposes, but in her opinion there is a good field for new careers in connection with demonstrator "jobs" for electrical undertakings giving service, as well as supplying current. We are inclined to think Mrs. Hammer is not satisfied with what she has found at some cooking centres; for she strongly emphasizes the necessity for electric cookers and other apparatus at such places being of the very latest type, and that the advice and supervision provided should be beyond reproach. The lady superintendent at domestic training centres should be kept particularly well up-to-date electrically. The necessity for this can be well understood. A further suggestion is that it would pay undertakings to provide everything free of cost to the Education Committee, and regard the expenditure as being in the cause of electrical education and publicity. Among other papers read before the Women's Section, was one by Mrs. T. A. Kingham. We gather from an abstract of this that she is not altogether satisfied with the amount of consideration manufacturers give to electrical household appliances from the woman's point of view. She holds that if electricity is to become the popular necessity it is made out to be, something must be done by station engineers and contractors to standardize not only the various grades of utensils, but the household fittings necessary for their use. For example, all plugs and sockets of the same capacity should be of a standard size, and interchangeable. Standardization should be applied generally to all apparatus, so that kettles, toasters, coffee percolators, &c., for table use, could be employed in turn with the same flexible, instead of having an independent one for each. Again sockets on the skirting boards should have a switch next to them, or else the metal portion should be well down inside the china, so that there is no danger to children. She also thought that the plugs should be fixed higher up the wall in about the same position as the usual bell push. This would be more convenient and obviate much bending about—and danger. There were many practical suggestions in the paper, which show that electrical women are finding out defects in electrical men's work.

BOSTON GAS LIGHT AND COKE COMPANY CENTENARY CELEBRATIONS.

A century of service has just been completed by the Boston Gas Light and Coke Company, who are to celebrate the event to-morrow. Their record, which is set out in an interesting booklet prepared for the occasion, is one of steady progress. In 1858 the gas sold amounted to 23,900,000 c.ft.; in 1924, 124,961,000 c.ft. were sold.

MILESTONES IN THE COMPANY'S HISTORY.

The Act for lighting with gas the borough and neighbourhood of Boston received the Royal Assent on May 2, 1825; and on May 12 of that year the first general meeting of the Company

Mr. Tom Kitwood, J.P.
Chairman of the Boston Gas Light and Coke Company.

was held under the chairmanship of Mr. John S. Baily. It was at this meeting that Mr. John Rofe was appointed Engineer. In 1827 the capital of the Company was increased from £8000 to £10,000. In 1856 Royal Assent was received to an Act "to confer further powers on the Boston Gas Light and Coke Company;" and in this year a plant was erected for the manufacture of sulphate of ammonia. A plant for the distillation of coal tar was installed in 1865, and in 1870 the works were reconstructed to plans by Mr. R. P. Spice, Consulting Engineer. In 1871 a Bill was passed to amend the Boston Gas Amendment Act, 1856, and to enable the Company to raise further capital. November, 1922, marked the installation of new carbonizing plant, electric stoking machine, coal elevator, and generating plant; and in November, 1923, the thermal basis of charges for gas supplied came into operation.

The present Directors of the Company are Messrs. T. Kitwood (Chairman), J. W. Thorns (Vice-Chairman), J. Shaw, H. A. Sherwin, R. G. Shadbolt, and J. G. Clark; and the Engineer and Manager is Mr. John Stewart Dougall.

PRESENT WORKS.

The coal carbonized is best South Yorkshire, and is delivered direct into the works by the L. & N.E. Railway Company. Wagons with bottom doors allow the coal to fall direct into a breaker pit, from which it is lifted, by means of an electrically-driven elevator, to a drag-bar conveyor travelling the entire length of the retort house, and so arranged that the coal may be dropped at any stage, to the hoppers, which have a capacity of about 90 tons.

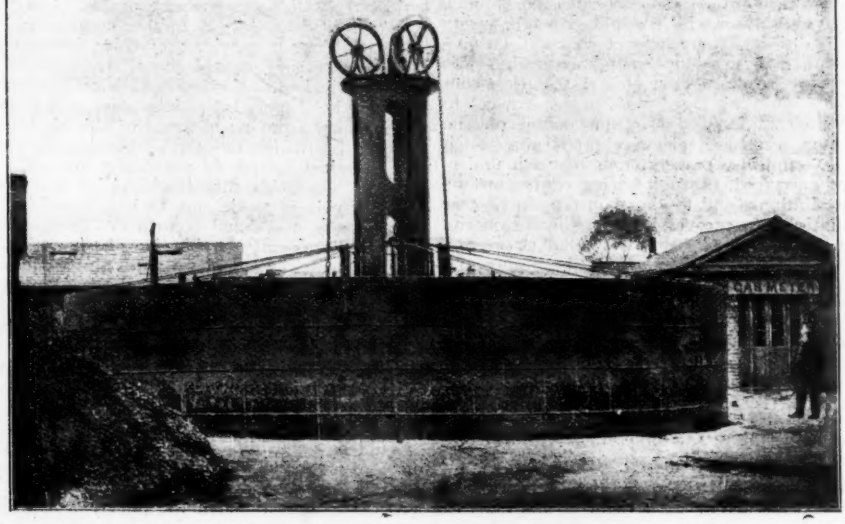
Mr. J. Stewart Dougall.
Engineer and Manager.

The charging and discharging of the retorts are carried out by a Drakes stoking machine. The generating plant consists of two 36-44 B.H.P. National gas engines, driving two 25 KW. British Thomson Houston generators, with the necessary switch gear and fittings. Annular condensers of a capacity of 500,000 c.ft. per day were erected in 1912 by Messrs. R. Dempster & Sons, Ltd., of Elland. Two exhausters, steam driven, each of 40,000 c.ft. per hour, are provided.

The wet purification plant comprises a tower scrubber, a Livesey type washer, and a Holmes rotary washer scrubber. Dry purification is effected by means of five luteless purifiers, each 20 ft. square, one box serving as a catch box.

A sulphate of ammonia plant capable of producing 1½ tons of sulphate per day is in operation; and during last year 96 tons of this fertilizer were disposed of for local requirements.

The Company also have a tar dehydration plant, and dis-



CENTRE COLUMN HOLDER, 1826.

pose of the prepared tar to the surrounding town and county authorities.

DISTRIBUTION.

In the year 1897 the Company had some 300 cookers in operation in the town. At the present time there are approximately 3100 cookers and 570 fires, coppers, radiators, geysers, &c., in use in the Company's district.

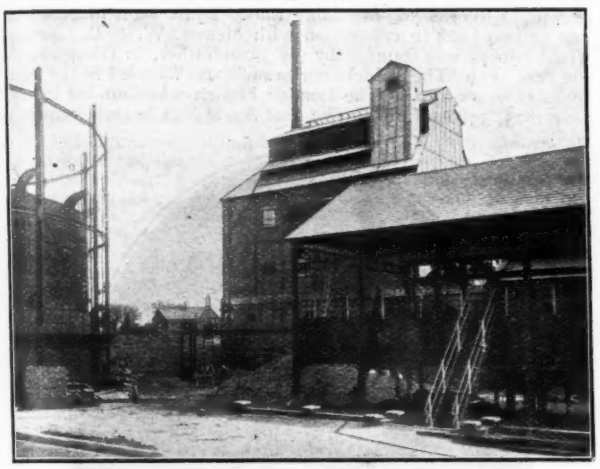
The adoption in the year 1897 of the prepayment meter system provided a great stimulus to the use of gas in the homes of the smaller domestic consumers. At that time the Company registered 1800 consumers, of whom 150 were prepayment consumers. At the present time the Company register 5793 consumers, of whom 3026 are supplied by prepayment meters.

During recent years the Company have devoted considerable attention to the distribution system, and now, by undertaking the complete installation of supplies, fittings, and appliances, endeavour to give their consumers the best possible service, and ensure their commodity being used in the most economical and efficient manner.

WOODALL-DUCKHAM VERTICALS AT NEWBURY.

Official Inauguration.

The official inauguration took place last Monday, July 6, of a new vertical retort installation at the Newbury Corporation Gas-Works, of which Mr. W. R. Davey is Engineer and Manager. From particulars appearing in a booklet prepared for the occasion, it seems that the present Chairman of the Gas Committee (Alderman Chas. Lucas) has been connected with the undertaking since it was purchased by the Corporation from the Gas Company in 1878, and has been Chairman of the Committee for most of the time. His labours and foresight have been largely responsible for the present strong financial position of the undertaking.



Entrance to the Works.

The present site was purchased in 1880; but the west retort house, now disused, and the No. 1 gasholder, being renewed, are practically the only portions of the plant put down then which are still existing. The retorts at that time installed consisted of five beds of six retorts each; but their use had to be discontinued. A new retort house, coal stores, and bench of retorts were subsequently constructed east of the house, to supersede the defective plant. The retort house was used as a coal store until 1901, when regenerative settings were installed. These are now out of operation, having been superseded by the vertical retorts placed in the east house on the site of the retort settings demolished to make room for them.

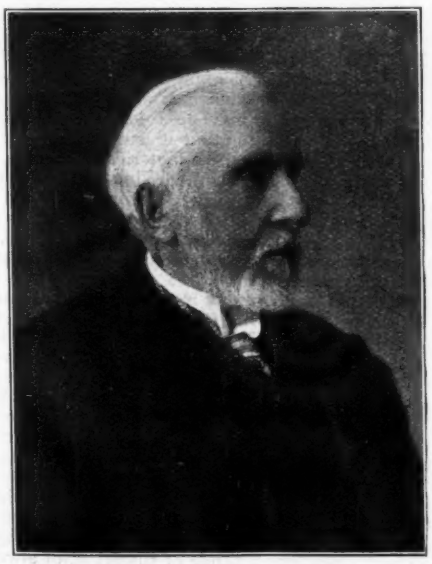
The important question of improved methods of carbonization had been under discussion by the Gas Committee since 1912; but, owing to the outbreak of the war, the matter had to be deferred until 1919, when it was revived. The estimated cost at that time, however, precluded the adoption of the vertical retort system. The costs of construction work having fallen in 1923, plans were prepared, and tenders invited from various firms. The different schemes were closely examined, and that of the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., was decided on, as their particular plant was more adaptable to the existing buildings, and made the final costs of the complete plant the most favourable. The Gas Department undertook to do all the work of demolition, construction of foundations, drainage, and other necessary work from and below floor-line, the levelling-up of the retort house walls, &c., in readiness for the steel-framed superstructure; also the coke gantry, screens, &c.

The retorts are about 25 ft. in length, by 4 ft. 3 in. by 1 ft. 7 in. cross-section, and have a capacity of 3 to 4 tons of coal per 24 hours. The bench at present comprises eight retorts, but is arranged so that two more retorts can be added when required. The taper of the retort is not even from top to bottom; the majority of the taper being confined to the upper 10 ft. where the maximum swelling of the coal takes place. The combination of this exaggerated taper with the existence of the high combustion chamber temperatures at the top of the retort enables the sticky and strongly swelling coals to be successfully carbonized without undue trouble.

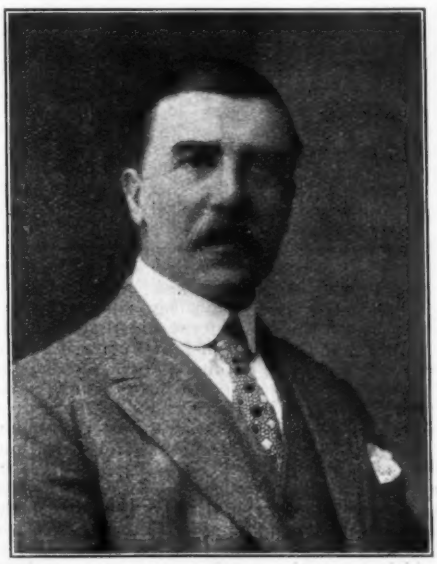
A waste-heat boiler is installed to recover the heat contained in the waste gases from the settings. The amount of steam which can be produced in this manner amounts to about 2 lbs. per pound of coke consumed as fuel in the producers. This steam is used for driving an engine and steaming the retorts.

Two producers of the step-grate type are installed at the end of the bench; and these only need pricking-up, the arduous and unpleasant work of clinkering being reduced to the minimum. A steam-driven goods lift is provided for raising coke in skips to the overhead bunkers for feeding the two furnaces, or on to the gantry for distribution into the yard.

The coal, as it arrives at the railway siding, is unloaded into the boot of a steam-driven elevator, by which it is raised to the coal bunker at the top of the building, where it falls on to a conveyor which distributes it evenly into the bunkers.



Alderman Charles Lucas,
Chairman of the Gas Committee.



Mr. W. R. Davey,
Engineer and Manager.

CENTENARY OF W. & B. COWAN.

1825-1925.

A function of a particularly pleasing kind was held in the Co-Operative Hall, Manchester, on the 19th ult., the occasion being a tea and social evening attended by the Manchester employees of Messrs. W. & B. Cowan, on the invitation of Sir Henry Cowan, M.P., Chairman of Messrs. Parkinson and W. & B. Cowan, Ltd.

In January last, to celebrate the one hundredth year since the foundation of the firm, the Manchester employees presented Sir Henry with a loving cup; and he then promised that he would meet the workers socially at a future date—the present occasion being the fulfilment of that promise. Mr. Franklin Thorp, Director and General Manager of the Manchester Works of the Company, occupied the chair, at Sir Henry Cowan's request, and there were also present Lady Cowan, Mr. and Mrs. Eric Cowan, Miss Jean Cowan, Mrs. Thorp, Sir William Haldane, Mr. J. A. Macleod, and a company of nearly three hundred employees.

After tea, an excellent programme of music was rendered. Lady Cowan gave a solo on the violin (accompanied on the piano by Mrs. Eric Cowan), on which instrument she is an accomplished performer, and Mr. Eric Cowan played several pieces of his own composition, which showed real musical ability and were well received.

At the conclusion of her violin solo Lady Cowan was presented with a beautiful bouquet of carnations, and in response to loud applause made a graceful speech which was listened to with close attention by the large company.

At a later stage, bouquets were presented to Mrs. Eric Cowan, Miss Jean Cowan, and Mrs. Thorp; and in a graceful speech Mrs. Eric Cowan returned thanks.

A vote of thanks to Sir Henry Cowan, proposed by Mr. WHATMORE, Works Manager, and seconded by Mr. A. REYNOLDS, Tinsmith, was received with loud acclamation and the singing of "He's a jolly good fellow."

A FIRM OF WORLD-WIDE ACTIVITIES.

Sir HENRY COWAN, in reply, said: "Ladies and gentlemen, this programme, which was compiled by your kind friend Mr. Thorp, was evidently designed with a view to letting me off making a speech, because I notice that the house is timed to rise at 9.45, and it is now 9.40. Well, to some extent I congratulate you, because you came here to enjoy yourselves, and the musical programme that has been provided was so excellent that no amount of speech-making could adequately take its place; but I would like to take the opportunity of saying one or two things. First, I would like to say how much touched I was when in January last you presented me with a loving cup in commemoration of the centenary. I was touched by what appeared to me to be a very kind thought, and I was much interested to think that the employees of the Company in Manchester should not only have done this, but have done it at the earliest possible moment. Well now, we are met here to-night to celebrate our 100th birthday, and this is a great occasion. It is the birthday of us all, because we are all working for the great concern whose 100th anniversary this is. I would like to remind you that if you go back to the date on which my grandfather, the great-grandfather of my son, established the business in which we are all engaged, it was only ten years after the Battle of Waterloo; and now we are meeting here less than seven years after the conclusion of a much greater war. We are met at a time when there are thousands and hundreds of thousands of workless people in the country, and the conditions are not altogether dissimilar to what they were after the closing of the Napoleonic war; but we are hoping for a great revival of industry, and at any rate we are determined to work together and to do our best to bring about what is absolutely necessary if our country is to survive and continue to prosper as the great nation which it has been in the past. Well, talking of fathers, grandfathers, and sons and grandsons, I think you will agree with me that this great Company of ours is still—though it has many shareholders—what might be called a family business. We have, speaking for myself and family, kept in close touch with the business; and I do venture to claim for myself and my predecessors, and for those who will carry on after me and who are with me now, that we have not been a conscienceless corporation, but a very human institution. I remember at an election held in my constituency at Islington two years ago, at the time when I first contested that seat, a certain man who wanted to put me into a hole shouted out from the back of the hall: "How do you justify paying 30 p.ct. dividend in your Company?" But I said: "We do not." He said: "You do." I said: "The highest dividend we have paid for years is 8 p.ct." "Then," he said, "you must be a very bad business man." Well, I would rather have the name and the reputation of being a bad business man than of being a profiteer or one who, in the words which Mr. Mackay used a little while ago, "grinds the faces of the poor." I would like to tell you that on the enormous capital of nearly £1,000,000 sterling which we employ we do not pay to our shareholders and debenture holders, on the average, a greater dividend than 7·1 p.ct., just over 7 p.ct., and that less tax—that is to say, the average net return the shareholders and debenture holders receive is only 5 p.ct. I would tell you that during the war, when we turned over our factories to the service of the State, when we made munitions instead of meters, we were one of the very few large concerns engaged on national work who never paid a penny of excess profits duty, because we never made a penny of excess profits. We did not try to bleed the nation, and we have not tried to bleed our workers. We want to live and let live, and we want you to have your fair share, and you are getting that, and a great deal more than that, now. There is keener competition than there has ever been in my time, and I can look back at least 40 years. Though we are not making any profit in the gas-meter trade at present, you are all getting good wages; and I rejoice that you are. But I do ask you in return for what we are doing—and we are making every effort to keep you employed—I do ask you in return to help us all you can by giving us also of your best. I believe at Victory Works you are doing that. I just want to give you one or two facts in connection with Messrs. W. & B. Cowan. The business was founded by my grandfather, in Glasgow, in the year 1825. The Manchester branch was founded in the year 1874, 51 years ago. The London branch was founded in the year 1873, 52 years ago. The first Australian branch, which I established myself, was founded in 1893, or 32 years ago. We opened a factory in Melbourne in 1905, 20 years ago. We opened our factory in New Zealand in 1911, 14 years ago. We went to Brisbane to manufacture gas-meters in 1915, only 10 years ago. From a small beginning in Glasgow 100 years ago has grown up an enormous business which stretches all over the world; and the same may be said of the Company as is said of the British Empire—that it is one on which the sun never sets. We have more than 20 factories, nearer 30, I think, than 20, scattered all over the United Kingdom and the British Empire. We have no factories in Germany. Messrs. Parkinson, with whom we are closely associated, as you know, have a factory in Cottage Lane, London, in which, in 1816, 9 years before my grandfather commenced business in Glasgow, the first gas-meter was manufactured; and from that time to this we have made the best gas meters that can be made, or ever will be made. We do not fear any competition if our staff is as it has been in the past, and, I am confident, will be in the future—loyal and enthusiastic. I think what we have got to realize as employers and employees is that our interest is the same—"Co-operation, each for all and all for each." We must work together. What happened in Russia when the capitalists were expelled? And what is the result? The poor are the greater sufferers. The workers are the people who have lost more than anyone else. That is not the way to reform. That is not the way to happiness. The way to happiness and to peace and prosperity is for all to work together; and I think this will be attained if once we all make up our minds to abandon on both sides that attitude of suspicion, of always fearing that the other side has "something up its sleeve." Once

Sir Henry Cowan, M.P.

we can trust each other, a better atmosphere will prevail in the country.

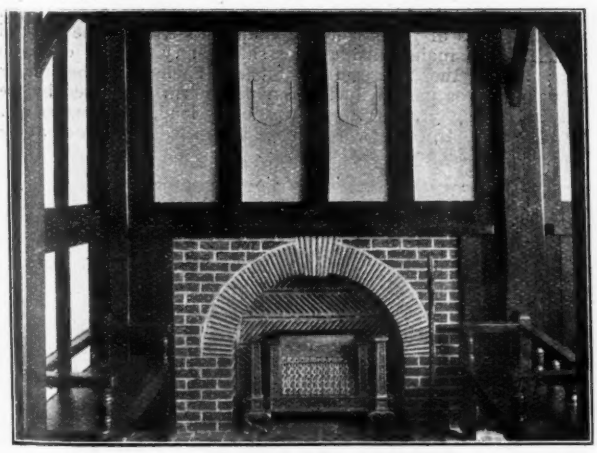
In the course of his speech Sir Henry told a number of humorous stories which created much merriment, and he also mentioned several members of the Company present who had been in its service and in that of its predecessors for various lengthy periods up to fifty years. Continuing, Sir Henry said: Then we have Mr. Thorp. [Loud applause, followed by the singing of "He's a jolly good fellow."] I am immensely delighted at that tribute to Mr. Thorp's popularity. For a man to be at the head of a great organization such as Victory Works, and to be so popular, is the greatest tribute that could be paid to him by his workers. Yes, he is "a jolly good fellow," and he is lots of other things too. He is not only a man with more than a commercial instinct, he is a born diplomatist, and he says so many nice things about me that I feel inclined to blush, and only wish they were true. Then we have Sir William Haldane, who is a distinguished member of a very distinguished family, whose services to our Company I cannot attempt to recite. Since he joined our Board, about seven years ago—and that is by no means the beginning of his connection with our Company—he has rendered us services which no other Director could possibly perform. Mr. Macleod, whom you have all met before, has a record of service with the Company of no less than 48 years—two years will celebrate his jubilee—and knowing his abilities as I do, I wish he could be with us for another 100 years. I again thank you on behalf of myself and my wife for the splendid reception given us to-night, and again for the loving cup, which will always remain one of my most treasured possessions.

Sir WILLIAM HALDANE, in a few well-chosen sentences, also addressed the meeting; and a delightful evening ended.

NEW SHOWROOMS AT BLACKBURN.

There was a pleasing ceremony at Blackburn, on Monday afternoon, June 29, when the new showrooms established in King William Street by the Gas Department of the Corporation were formally opened by the Mayor, Councillor J. Stanworth, J.P. Mr. E. HAMER, J.P., Chairman of the Gas Committee, presided over a representative gathering.

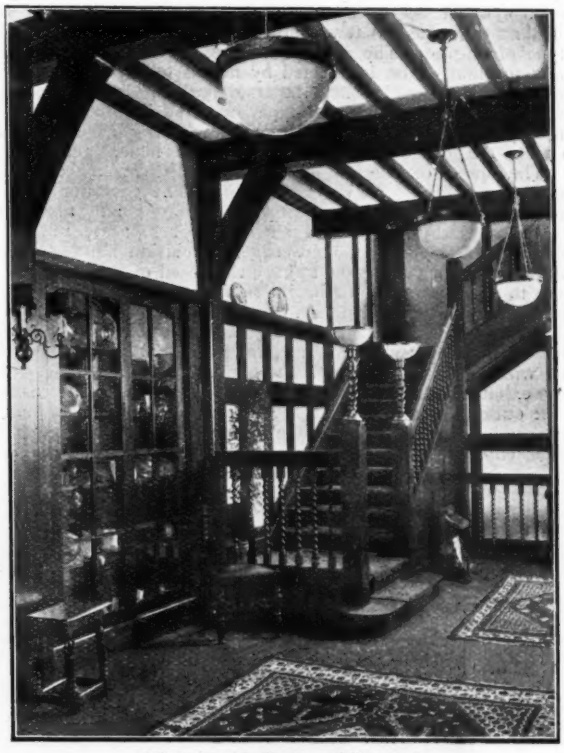
The MAYOR congratulated the Chairman, Vice-Chairman, and members of the Gas Committee, as well as the Gas Engineer, his staff, the architect, and the contractor, on the excellence of the showrooms. Blackburn had been noted for many years for its municipal undertakings. He regarded the new showrooms as a step in the right direction. They should remember that municipal authorities were expected not only to provide schemes of utilitarian advantage, but also to cater for grace and beauty. Those responsible for these showrooms had happily combined the two qualities. They were a credit to the designer, to the contractor, and to the townspeople. There was an interesting and useful collection of gas appliances which could not help appealing to gas users. Many of the appliances would go a long way to assist the harassed housewife in solving the problem of the domestic servant shortage, and would also help in creating what all municipalities were trying to achieve—the ideal home. The idea of the showrooms was not merely to get profit for the Department, but also to create a form of publicity for the convenience of the townspeople. (Applause.) There were thousands of people who knew little about the different uses to which gas could be put. The new showrooms enabled them to gain valuable information.



The Inglenook.

Mr. HAMER said the necessity for providing adequate gas showrooms to meet the growing needs of the community had been forced on the attention of his Committee by a rapidly increasing demand for gas apparatus on the part of all consumers. The Committee had always been keenly alive to the necessity for educating consumers concerning the most up-to-date appliances, to enable them to get the utmost value from the gas consumed. The steady and persistent advertising carried on by the Department, and the system of regular inspection of apparatus inaugurated by Mr. Mitchell, had splendidly backed the national system of publicity carried out for the whole gas industry by the British Commercial Gas Association, with which Blackburn was identified. This publicity was bearing fruit. For the last 20 years, the Board of Trade returns of gas output showed that the first five years recorded an increase of 21 p.ct., the second five years 23 p.ct., the third 27 p.ct., and the last 32 p.ct. These remarkable figures endorsed in a wonderful way the wisdom of the progressive policy adopted in the industry. Blackburn had played a part in this general advance. The gas consumption locally during the last five years had increased from 810 million c.ft. to 1004 million c.ft. During the last six years the consumption had increased 36½ p.ct. The number of gas appliances had increased from 36,983 in 1920 to 46,879 in 1924. In their new showrooms, the Committee had tried to produce something which would be not only a good investment and a source of growing profit, but a credit to the Corporation.

Mr. W. M. MASON, Manager of the "B.C.G.A.," expressed regret at the absence of his old friend Mr. G. P. Mitchell, the Blackburn Gas Manager, and expressed the hope that he would soon be back at his post. He congratulated the Corporation on their enterprise in providing such handsome and well-equipped showrooms. He believed they would prove a valuable adjunct to the gas undertaking of the borough. It was the duty of a municipality to advertise, not as an easy means of spending money, but solely in the public good. Education was essential if consumers were to know what gas could do to help them; and by increasing the demand for gas, prices could be brought down, and the heavy capital expenditure made remunerative.



"Catering for Grace and Beauty."

THE SHOWROOMS.

The Architect has made an effort on the ground floor to recapture the charm and atmosphere of an old-world interior, with its age-furrowed timbers and irregularly-formed plaster panels of other days when life moved more leisurely. Simple and solid furniture adds to the effect. There is an inglenook, with a brick hearth and open fire; and elsewhere a fire of special design for burning coke. The offices for the staff and manager are situated at the rear of the ground floor showroom, and are treated in a similar manner, being entered under a beam, on which hangs a lamp of antique brass.

Passing up the well-arranged and roomy staircase, with its heavy handrail and twisted oak balusters, one enters the first-floor showroom designed in the Renaissance style. Here are displayed all the latest model gas fires of various designs and sizes.

The second floor is used for cooking demonstrations. Here are displayed the latest in stoves and ranges, and hot-water appliances. At the rear, a bath and a lavatory are supplied with hot water from a geyser.

NOVEL METHOD OF DRIVING A FAN THROUGH GEARING FROM A GAS ENGINE.

By FREDERIC G. GORMAN, Assoc.M.Inst.C.E.

The problem of driving a gas booster through gearing from a gas engine has in the past presented many difficulties. Apart from the fact that there must be a considerable increase in speed from that of the gas engine to drive a booster at anything like 4000 to 5000 r.p.m. (a thing of difficulty itself) there is also the fact that the gas engine does not revolve at a uniform speed, whereas the high speed and inertia of the booster prevent the changing of its speed to suit the engine. On one side of the transmission gear there is a variable velocity, on the other side a uniform velocity; and the problem has resolved itself into finding a suitable means for transmitting power under the severe conditions of increasing the speed given by the prime mover and at the same time converting a variable velocity into an uniform one. For this to be done with efficiency and durability the use of rigid gearing is absolutely precluded.

This problem has been met at the Lower Sydenham Works of the South Suburban Gas Company, and it has been suggested that a description of the plant would be of special interest to the readers of the "JOURNAL."

It will be seen from fig. 1 and cross-section fig. 2, that the prime mover is a two-cylinder gas engine which drives through a special gear box on to a 4-stage fan, the capacity of the plant being 250,000 c.ft. of gas per hour against a pressure difference of 80 in. W.G. The gas engine is a new model recently designed by the National Gas Engine Company, this type being made from two to six cylinder engines on the four-stroke cycle, each cylinder being capable of developing 50 B.H.P. constant load on town gas. A few points may be noted of this particular type of engine. The reciprocating parts are totally enclosed, and the lubrication is effected by means of a pump supplying oil under pressure through the crankshaft to all bearings. The valves are of the overhead type, operated by means of push rods and rockers from the camshaft, which is driven from the end of the crankshaft by a pair of single helical gear wheels.

The speed of the engine is controlled by a centrifugal governor mounted on the crankshaft. The governor actuates the governor valve which throttles the gas and air in the cylinders, but the gas and air are kept separate until they actually enter the inlet valve cage. Provision has been made for a special speeder gear to vary the speed of the engine from 250 to 350 r.p.m.; this being done by an external hand wheel while the engine is running. The ignition is effected by two sparking plugs in each cylinder, operated by two magnetos driven by an inverted tooth chain. The cylinders are cooled by water circulated through the water jackets and covers, and the exhaust valves are also provided with water-cooled casings. The outlet water pipes from the various parts of the engine discharge into open funnels at the top of the water-cooled exhaust pipe, enabling the attendant to regulate the flow and temperature of the water as desired; the cooling of the water being effected by a Heenan & Froude cooler. The engine is started by compressed air.

As this particular engine embraces the latest developments in gas engine practice, it might be of interest to learn of the performance under strict test conditions. Mr. W. A. Tookey, of Victoria Street, London, acting for the Gas Company, supervised the tests; and some of the results are given in Tables A and B.

TABLE A.

—	Test No. 1.	Test No. 2	Test No 3.	Test No. 4.
Booster—				
Gas delivered, c.ft. per hour at 30 in. Hg. and 60° Fahr.	181,000	202,500	218,000	250,640
Inlet pressure at booster, inches of water	10	9·86	7·8	7·6
Outlet pressure at booster, inches of water	52	60·8	69	90
Outlet temperature at booster, ° Fahr.	77·6	79	83	94
Engine—				
R.P.M.	249	275	301	348
Water inlet temperature, ° Fahr.	63	63	64	68
Water outlet temperature, ° Fahr.	89·5	89·5	94	107
Gas consumption, therms per hour	5·76	6·95	8·7	12·82
Gas delivered, c.ft., by blower per therm consumed by engine	31,400	29,100	25,000	19,600
Mean pressure from indicator diagrams, lbs. per sq. in.	61·5	69·5	76	89
B.Th.U. per I.H.P. per min.	133	129	135	147·5
Thermal efficiency per I.H.P.	·32	·33	·315	·287
Tookey factor: Mean pressure on piston / B.Th.U. per c.ft. in mixture	2·05	2·15	2·02	1·84
Gears—				
Oil temperature, ° Fahr.	113 to 119	120 to 124	124 to 127	129 to 139

It will be noticed that at the full output of 250,000 c.ft. per hour on the fan, obtained with the engine running at 348 r.p.m., the average mean pressure in the cylinder was 89 lbs. per sq. in., while the highest mean pressure was 95 lbs. per sq. in. On the basis of gross calorific value and I.H.P., the thermal efficiency is maintained at the satisfactory figures of 29 to 33 p.ct. Another interesting point (see Table A) is the number of c.ft. of gas passed by the fan per therm consumed by the engine; being 31,400 c.ft. at the lower load, and 19,600 c.ft. at full load. In other words, 0·032 therm was consumed at the

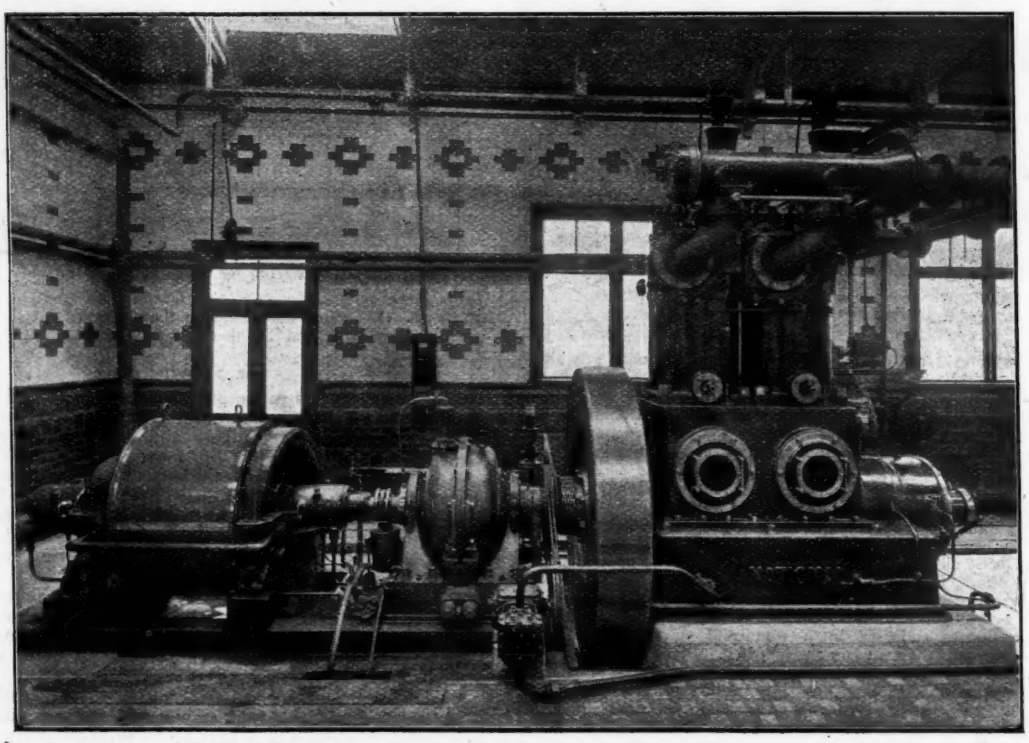


FIG. 1.

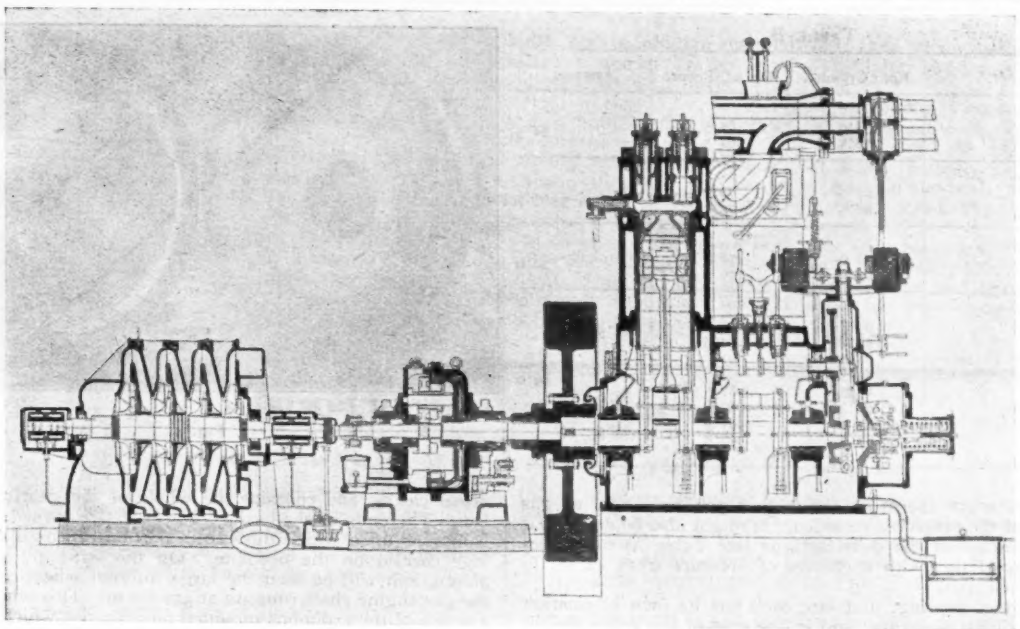
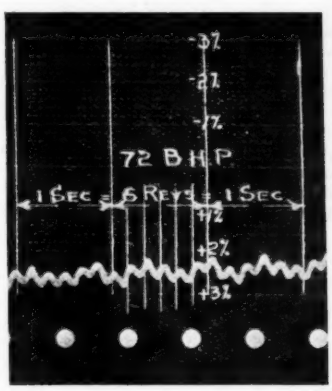


FIG. 2.



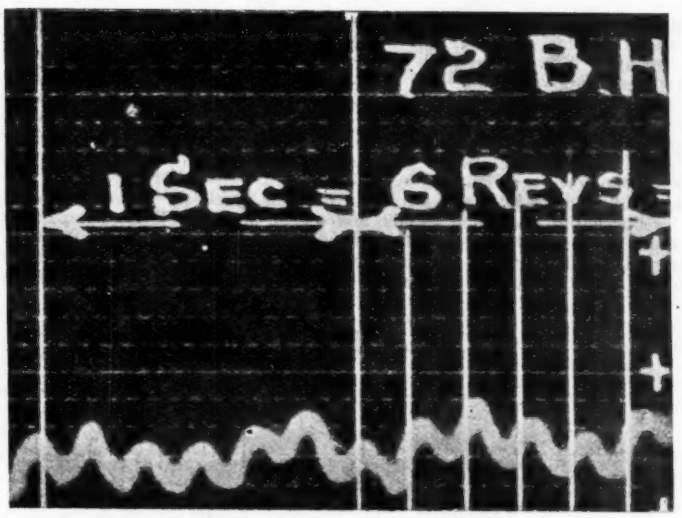
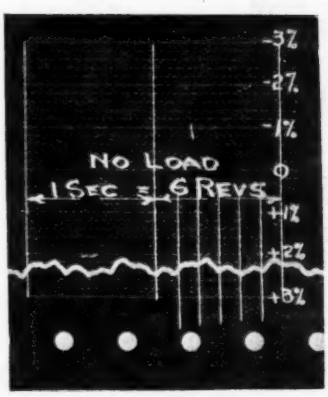


FIG. 3.



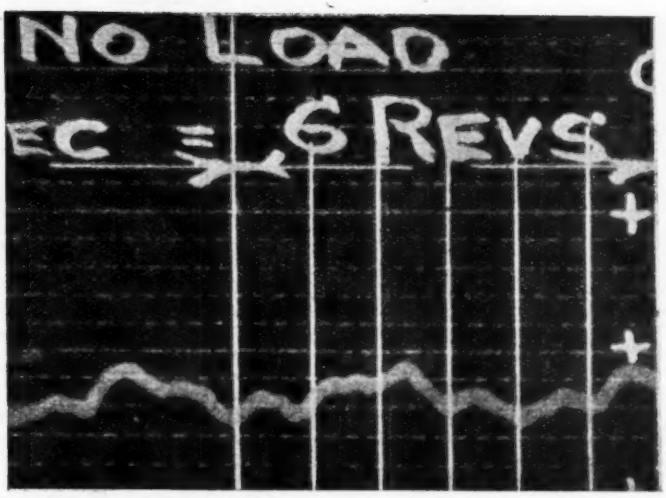


FIG 4.

TABLE B.

—	No. 1 Cylinder.	No. 2 Cylinder.	Average.	
Test No. 1—				
	58·0	65·5	61·5	
	58·5	64·5		
Test No. 2—				
	67·0	72·3	69·5	
	68·5	72·0		
Test No. 3—				
	72·0	78·5	76·0	
	73·5	79·5		
Test No. 4—				
	90·0	95·0	92·5	89·0
	91·0	94·5		
	81·0	91·0	86·5	
	82·3	91·8		
	87·5	87·5	88·0	
	86·3	89·8		
	85·0	91·5	88·5	
	87·0	90·5		

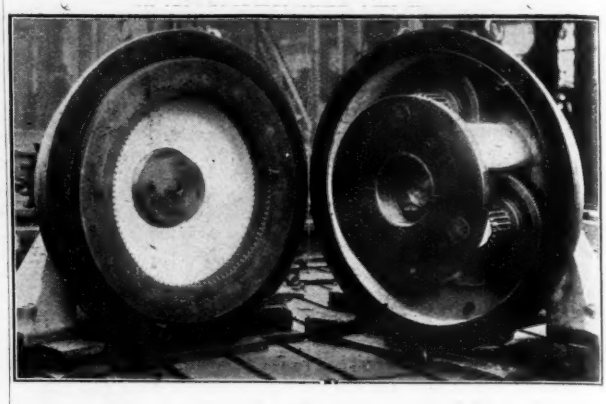


Fig. 5.

lower, and 0·051 therm at the higher per 1000 c.ft. of gas delivered at the pressures recorded. It might also be noted that the temperature of the delivered gas (see Table A) rose from 71·6° to 94° Fahr. with a change of pressure from 42 in. to 82·4 in W.G.

The engine, gearing, and fan, each has its own lubrication system distinctly separate; and in the case of the gears the oil is water-cooled on its circulation round the gearbox. It will be seen from the cross-section that the gears and fan are on a common bedplate, the gas engine having its bedplate entirely apart. The foundation of the whole unit is isolated from the floor by a narrow channel; the object being to eliminate any possibility of vibration affecting gas mains near by. Upon testing the cyclic irregularity of the engine, not more than 0·5 p.ct. variation was recorded, this being shown on figs. 3 and 4, taken at 72 H.P. and no load. A portion of each chart is also magnified, to give more clearly the cyclic variations.

At the same time it was thought that considerable trouble might be experienced if this small variation was transmitted to rigid gearing having an increasing ratio of approximately 12 to 1. After much investigation it was decided to use a concentric speed transformer which was made by Messrs. Bostock and Bramley, of Huddersfield. This transformer was specially designed for fluctuating loads and speeds, and special provision has been made to relieve the torsional stresses from the gears.

The design is on the sun-and-planet principle; and it will be seen from fig. 5 that the centre portion of the unit is a cylindrical casing and contains the whole of the gearing mechanism. The ends of the casing, however, are turned, to provide trunnions upon which this centre portion can oscillate in bearings carried on the bedplate. On the left-hand side of the photograph will be seen the large internal wheel connected to the gas engine shaft running at 350 r.p.m. This wheel engages a series of three pinions mounted on a carrier which is secured to the other half of the casing as shown on the right-hand side of the photograph. Keyed to these three pinions are three wheels of fine pitch, which drive the high-speed shaft at 4100 r.p.m. It will be noted that the symmetrical driving of the high-speed pinion from three points removes all bearing loads from the high-speed pinion bearing, and at the same time removes almost all torsional stresses. It will be readily seen that, if the centre portion were free to rotate, no motion would be given to the driven shaft. As, however, it is prevented from rotating by being anchored to two long compression springs by means of a chain, it takes up such a position that the torque on the casing is balanced by the load on the springs. Any variation in the load or speed of either shaft causes the case to take up a fresh position—in other words, the compression of the springs balances the pull on the casing, and hence the latter is able to adjust itself to suit varying conditions, and so accommodate the fluctuations in the speed of the gas engine. This is really the first attempt that has been made in the solution of this problem, and represents a new departure with possibilities. In actual running the case oscillates to suit the cyclic irregu-

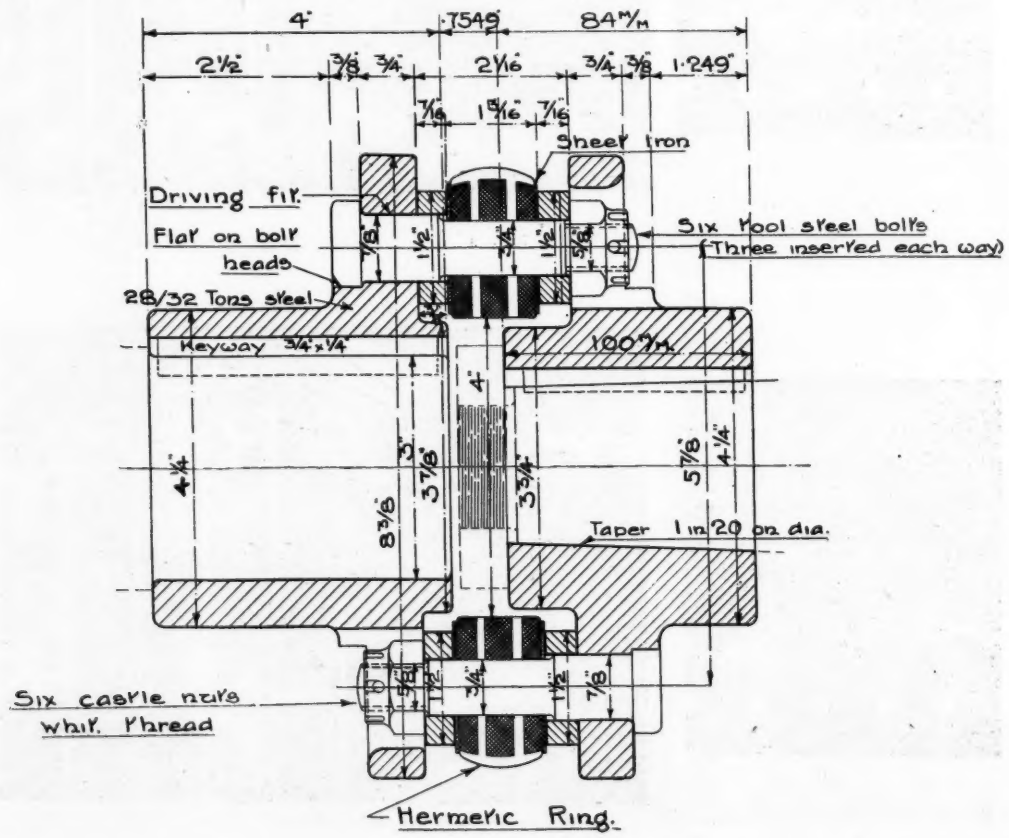


FIG. 6.

larities, thereby damping them down and giving the high-speed fan a uniform velocity. The lubrication of all bearings and gear teeth is by means of oil under pressure, which is supplied from an oil pump secured to the casing; the oil being circulated through a cooler after passing through a filter to remove any foreign matter.

The fan is the well-known "Rateau" multi-stage type, constructed by the Bryan Donkin Company, and therefore requires little description. The packings are of the carbon ring type held together by garter springs. The rings float on the shaft and do not take any of the weight. Owing to the high speed, the impellers were constructed of special high-quality steel, while the thrust on the impellers is to a great extent equalized by means of a pipe taken from the outlet end section to the inlet pipe. By this method the thrust is kept within practical limits, and in addition the shaft is located by means of thrust collars in one of the bearings. The latter are water cooled, and provided with forced lubrication.

Mention should be made of the two couplings on the plant. At first both couplings were of the chain-and-tooth type; and though the low-speed one was satisfactory, the high-speed coupling was distinctly noisy. It was eventually decided to abandon this type and revert to the pin-and-bush principle. Having regard to the power and speed, a special coupling was designed, a detail of which is shown in fig. 6.

In conclusion, the plant is considered satisfactory, and overcomes the difficulties mentioned at the commencement of this article. I am indebted to the Chief Engineer and Directors of the South Suburban Gas Company for permission to give publicity to these details.

A SIMPLE GAS CALORIMETER.

By HARALD NIELSEN, M.I.Chem.E., F.C.S., A.M.I.M.E.

A good gas calorimeter is, as a rule, expensive when looked at from the point of view of the manager or chemist of a small gas-works or any works laboratory where the determinations of the heating value of either town gas or industrial gases, without being daily routine work, have to be made from time to time.

A calorimeter such as that of Boys or Junkers is as perfect a piece of apparatus as can be desired when worked by an experienced manipulator; but when the ordinary chemist has to determine calorific values of gas, he is generally at least 4 to 5 p.ct. out. Hence the accuracy of a high-grade and expensive piece of apparatus is hardly called-for if a simpler and easily manipulated instrument will give the result with no greater margin of error.

About a year ago I observed a notice in Prof. Fischer's "Brenstoff Chemie" respecting just such an apparatus, the simplicity of which greatly appealed to me; and I set out to make it. After some modifications, and particularly after the introduction of an improved method of supplying the combustion air, I can now, after considerable experience, thoroughly recommend the little calorimeter. There is nothing patent about it at all. It can be made up from material generally to hand in every laboratory, and does not require half the skill necessary to build a single-valve wireless receiver.

The main parts for the calorimeter are: A 1500 to 2000 c.c. bottle with side tubulure, a 1000 c.c. graduated glass measuring cylinder, a 500 c.c. levelling bottle, a thick-walled glass cylinder open at both ends, for forming the actual calorimeter body, a bunsen burner, a "W.D." surplus spark coil, two 1 to 2 gallon tins, a small supply of glass and rubber tubing, and, finally, a good thermometer, divided in $\frac{1}{20}$° C., with magnifier reader.

The whole outfit is put together as shown in fig. 1, where (1) is the 1500 to 2000 c.c. bottle, which, fitted with a dip pipe (2) and side outlet (3) acts as a Mariotte even-pressure continuous flow bottle, and by means of rubber tubing and pinch cock (4) is connected to glass tube (5), of which a branch (7) terminates just under the top of the inverted 1000 c.c. measuring cylinder (6). Another tube, but made from 1 mm. bore capillary glass tubing, also terminates here, and water tightness is assured by rubber or paraffin-soaked cork (6a). On pipe (5), which is about $\frac{3}{8}$ in. bore, is an outlet branch (19) provided with a short rubber tube and pinch cock. Pipe (5) continues in rubber tubing (20) with pinch cock, which connects the levelling bottle (21) to the system. In connection with capillary tube (8) is a mercury pressure gauge (9) and branch (10). This latter is provided with short rubber tubing and pinch cock, and serves as inlet for the gas to be tested, which is aspirated by discharging the water in (6) through outlet (6b). The gas, after being washed through three or four times, is brought to the room pressure by operating the levelling bottle (21) and the pinch cocks (6b) and (20). In the same way the gas pressure is

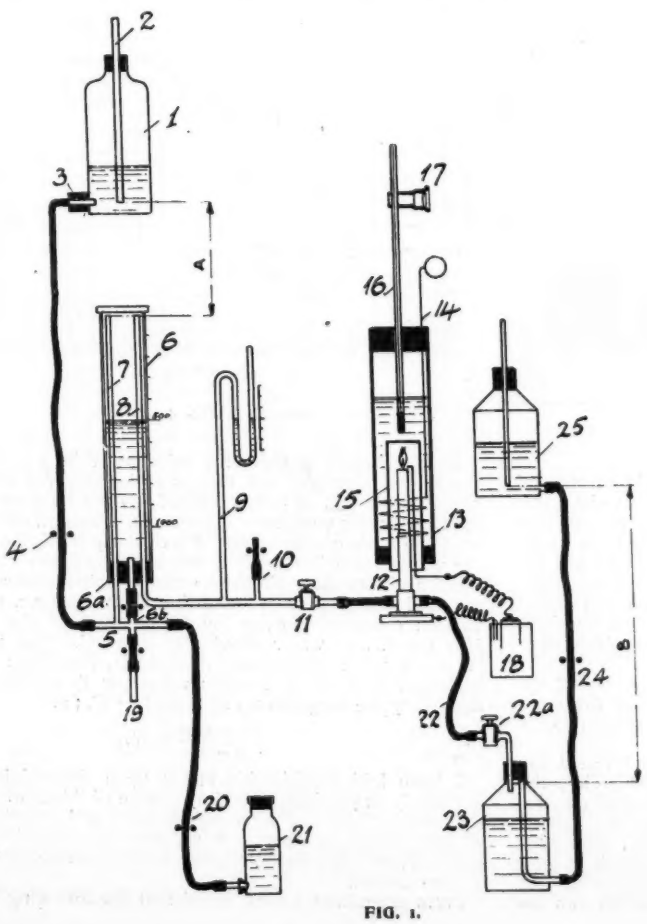


FIG. 1.

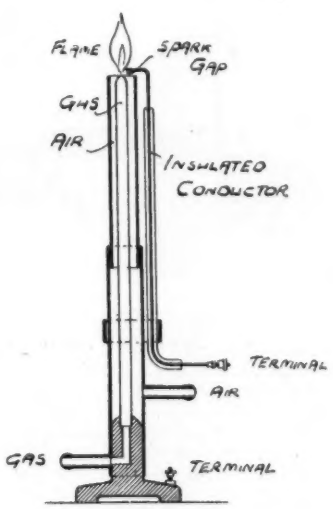


Fig. 2.

equalized in an Orsat burette. Stop cock (11) serves to cut off the burner (12) while manipulating the gas adjustments.

Fig. 2 is an enlarged view of the burner in section.

An ordinary bunsen burner is employed; the only alterations being that the gas nozzle is extended by means of a copper tube, $\frac{1}{8}$ in. inside diameter, flattened at the top end so as to form a very fine slit. The burner tube proper is extended by a glass tube, and the ordinary air inlets are closed. A branch pipe for air is soldered to the burner tube, so that the air required for the combustion enters through this pipe, passes up the annular space, and meets the gas at the top, where ignition takes place by means of a continuous spark from a small "W.D." ignition coil. One terminal is in electrical contact with the metallic body of the burner. The other terminal is conducted through an insulating glass tube to within $\frac{1}{16}$ to $\frac{1}{4}$ in. of the top of the central copper gas tube. The heat generated by the continuous spark is negligible.

By this arrangement no gas will escape in an unburnt state.

The burner (fig. 2) is one of the most important parts, and, therefore, a little care in making is well repaid. The top half of the burner tube should be made from porcelain or glass, owing to the poor heat conductivity of these materials. The actual calorimeter body (13) should have the following dimensions:

Glass container or vessel, $2\frac{1}{4}$ to $2\frac{1}{2}$ in. in diameter, length $11\frac{1}{2}$ to 12 in. Copper combustion chamber (15) should be $1\frac{1}{4}$ in. in diameter by 7 in. long, having a wall thickness about gauge 22-24. Bottom or top should be affixed with soft solder. The stirrer is made from gauge 10 or 12 copper wire, and 3 to 4 coils suffice. The stirrer penetrates through the removable wooden lid, and can be worked up and down from the outside during a combustion, until the maximum temperature reading has been taken. If the above-mentioned dimensions are adhered to fairly closely, the calorimeter will have the proper proportions for a water charge of 500 c.c.

The combustion air is supplied from two 1 to 2 gallon ordinary paraffin oil cans made up as Mariotte bottles. The whole arrangement of the calorimeter is clear from the illustration, and from the photograph (fig. 3).

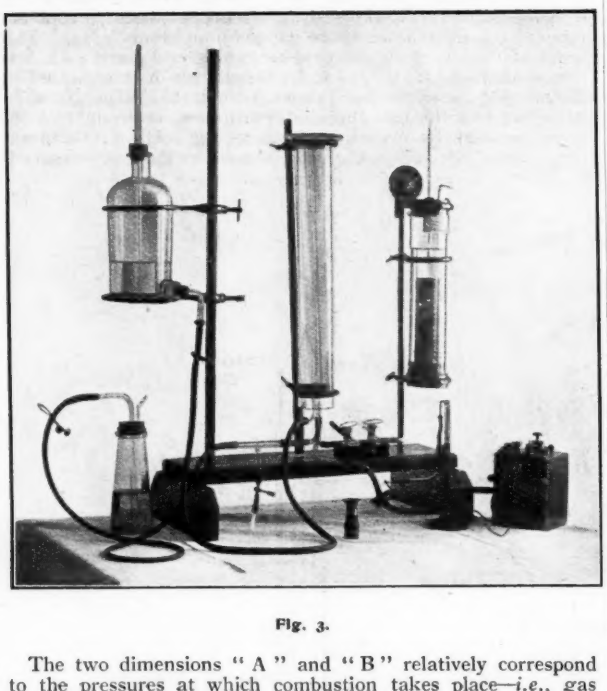


Fig. 3.

The two dimensions "A" and "B" relatively correspond to the pressures at which combustion takes place—*i.e.*, gas pressure and air pressure. The most suitable dimensions can be found by experience only; but if "A" is about 10 to 12 in. and "B" 15 to 18 in., these dimensions will not be too far out. At any rate, the flow should be adjusted so that a combustion takes from 8 to 10 minutes; the flame not being higher than about $\frac{3}{8}$ in. The top of the flame should be about $\frac{3}{4}$ to 1 in. below the copper bottom or top of the combustion chamber.

A rubber or well-paraffined cork is suitable for closing the bottom part of the calorimeter vessel and carrying the combustion chamber, so long as absolute water-tightness is assured.

After the apparatus has been put together and tested for tightness, &c., comes the important question of finding the proper water value, or, in other words, the number of calories or B.Th.U. representing a rise of 1° C. or 1° Fahr. in temperature of the calorimeter vessel *plus* 500 c.c. of water. The most convenient gas to use for these combustions is pure hydrogen or blue water gas—that is to say, a gas containing one or two burnable constituents only, the percentage of which can be determined exactly by analysis, and of which the heating values, gross and net, are known accurately.

For pure hydrogen the gross value at 15° C. and 760 mm. Hg. is 2800 Calories per cub.m., and the net value is 2360 Calories. For carbon monoxide the calorific value is 2800 Calories per cub.m.

The gross heating value is when the H_2O from the combustion is reckoned as water. The net value is when the H_2O is reckoned as steam at the same temperatures. Consequently, the difference between gross and net values is the latent heat in the amount of steam formed by the combustion. For instance, 1 cub.m. of hydrogen weighs 0·0827 kg. and produces on combustion $0{\cdot}0827 \times \frac{18}{2} = 0{\cdot}7443$ kg. of H_2O, the latent heat of which, in the form of steam at 15° C., is 440 Calories. Hence the net value = 2800 − 440 = 2360 Calories.

When determining the real quantity of gas, be it hydrogen or any other gas dealt with, it is necessary to allow for the water vapour present in the gas—*i.e.*, the vapour tension exerted at the various temperatures at which the operation takes place—and to reduce the measured gas volume to the proper standard barometric pressure and temperature from the momentary pressure and temperature of the room in which the calorimeter tests take place.

The standard temperature and pressure are reckoned as 15° C. (say, 60° Fahr.) and 760 mm. Hg. Furthermore, allowance must also be made for the volume of gas displaced by the solidity of the glass tubes in the gas space of the 1000 c.c. measuring cylinder.

If P_o = 760 mm. Hg. = normal barometer pressure.
P_x = barometer pressure read at time of test.
V_x = volume of gas in 1000 c.c. measuring glass, expressed in litres.
V_o = actual volume of gas reduced to standard.
t_o = absolute normal temperature = 273 + 15 = 288° C.
t_x = absolute temperature of V_x in °C. = room temperature.
t_i = increased temperature observed.
p = vapour pressure of water vapour in gas to be tested in mm. Hg.
(As water is generally the confining liquid, the gas can be reckoned as being saturated with water vapour.)

We can now express $V_o = V_x \frac{273 + t_o}{273 + t_x} \times \frac{P_x - p}{P_o}$.

All the above factors can be directly observed or calculated with the exception of P, which can conveniently be found from the vapour tension curve in fig. 4.

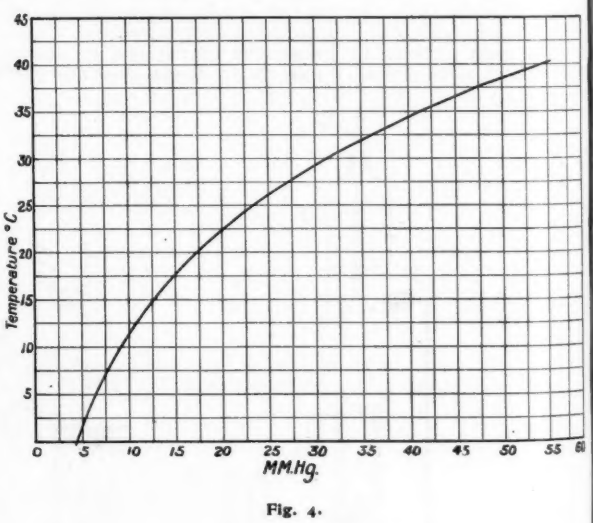


Fig. 4.

It is advisable to place the calorimeter in a position where there is no draught, and always to leave it full of water. A 5-litre bottle full of water should always be handy near the calorimeter, for washing-out purposes, if several determinations are to be made consecutively. Particularly is this the case where the water value has to be determined; and here at least half-a-dozen observations should be made, and the mean taken as the final figure. I have found that about 1000 c.c. of hydrogen will on combustion raise the temperature of the calorimeter *plus* 500 c.c. of water about 2·5° to 3° C. The water value (Wv) per 1° C. temperature increase is, therefore: Volume of hydrogen in litres × heating value per litre (2800 Calories), divided by the temperature increase in ° C.; or

$$\frac{V_o \times 2800}{t_i - t_x} = Wv.$$

I have laid considerable stress upon determining Wv as accurately as possible. The importance of this is evident. Also the burning rate and level differences "A" and "B" should be maintained as closely as possible once Wv is settled for good. It will then be found that results in close agreement can be guaranteed.

From experience I have found that the following volumes of

various gases will give a temperature rise which is not above the permissible:

Producer gas.	1000 c.c (120 to 180 B.Th.U.).
Water gas, carburetted . .	500 to 600 c.c. (270 to 320 B.Th.U.).
High-temperature gas . . .	500 to 600 c.c. (400 to 500 B.Th.U.).

If very rich gas, such as low-temperature gas (750 B.Th.U. and over) has to be dealt with, I generally take 200 to 250 c.c., and dilute same with air up to 1000 c.c. in the 1000 c.c. glass measuring cylinder.

The calculation of the heating value H (gross) of any gas tested is now simply ascertained from the formula:

$$W_V = \frac{V_0 \times H}{t_1 - t_x} \text{ or } H = \frac{W_V (t_1 - t_x)}{V_0}$$

H = calories per litre of gas.

It has been questioned whether the heat values given here are gross or net; but provided the combustion air is saturated beforehand—which one can take for granted here—the values given are the gross values, as the water vapour of combustion will condense out, owing to the pre-saturated air and gas, and thus give up its latent heat.

In order to ascertain temperature losses due to conduction to the surrounding atmosphere, I have found that, with a temperature difference of 3° to 3·5° C., the drop per half-hour was only 0·06° C.—negligible when the operations are completed in 10 minutes. The exit temperature of the combustion products was little more than the surrounding atmosphere (less than 2° to 3° C., which represents less than 0·5 p.ct. of the total heat absorbed). If it is desired to have H expressed in B.Th.U. per c.ft., the conversion factor is 0·11236.

In conclusion, I would like to say that, if this little calorimeter, which has been of great use to me, particularly in laboratory assays on low-temperature distillation where only small quantities of gases were available, can find use in small gas-works or works laboratories, my object is achieved. As I have mentioned, there is nothing patent about it.

NEW SAFETY GAS TAP.

Device for Preventing Possible Escapes.

Last week we had the opportunity of inspecting an interesting gas tap which was demonstrated to us by the Anglo-Saxon Trust, Ltd., of No. 58, Victoria Street, S.W. 1. The idea of this device, which is at once simple and effective, is to prevent any possibility of escape from any gas appliance. With the ordinary tap of (say) a hotplate burner, the flame, if in a low simmering position, is liable to be extinguished by a strong draught. If this is unnoticed, the accumulation of unburnt gas may result in unpleasant consequences. The same thing, of course, applies to the oven burners, or to those of gas fires and geysers—in fact, any gas-consuming appliance. Again, hotplate burners may be extinguished by the boiling-over of liquids; and—though such occurrences are fortunately rare—children have been known to turn-on gas taps, and leave them unlighted in the "on" position. All these hazards, state the Anglo-Saxon Trust, are obviated by the contrivance which they have brought out.

CONSTRUCTION OF THE "ALL-SAFE" TAP.

The new tap is very simple in its construction. Around the flames of the burner is fixed a tube of small bore, which is closed at one end. The shape and position of this tube depend on the type of burner on which it is fitted. For example, with ring burners the tube is circular, while with griller burners it may consist simply of a straight piece. The other end of the tube is carried to the bottom of the tap itself, where it is attached. When the gas is lighted, the flame heats the surrounding tube, thereby causing the air inside to expand. The pressure produced forces upward a diaphragm which is fitted at the bottom of the tap. The upward movement of the diaphragm raises a pin and allows the gas to pass to the burner. Until the diaphragm is raised the tap, which is maintained in tension by a spring, has to be held open; but the whole operation takes only a second or so. If, now, the flame is extinguished, the air in the small tube contracts, the pressure becomes normal, the diaphragm returns to its former position, and the tap, being in tension, automatically closes.

Nickel Table-Tops for Laboratories.—In a contribution to "Industrial and Engineering Chemistry," Mr. O. B. J. Fraser says it is remarkable that pure nickel, which for many years has been used so largely for such important and harshly-used pieces of apparatus as crucibles, tongs, &c., has not been long recognized as a material highly suited for surfacing laboratory tables. Pure sheet nickel combines in itself more of the properties desired for table-tops than the generally used non-metallic materials. With such metal, in sufficient thickness to avoid buckling, a table surface is provided which is hard, resistant to abuse, and not affected by exposure to heat. Chemical work bench-tops covered with sheet nickel have been in constant use for more than a year in the research laboratory of the International Nickel Company, at Bayonne (N.J.); and their service record has been excellent.

Radiating Value of Colours.

Writing in the "Heating and Ventilating Magazine," Mr. T. W. Reynolds says that when radiant heat falls on a body part of it is reflected from the surface; another part is absorbed and transformed into sensible heat, increasing the temperature of the body; while the remainder is transmitted through the body, and has no effect on the temperature. Both heat and light (radiant energy) follow the same physical laws. Radiating and absorbing powers are equal, and increase with the temperature. The author demonstrates by figures the superior radiating value of a dark surface for finishing coats; and adds that paints presenting a high gloss are less absorptive of thermal rays than those presenting a matt surface. Experiments showed that painting changes the radiation constant of the radiating surface, with practically no effect upon the heat loss by convection. It is therefore a surface effect; and no matter what paint is used for priming, the results depend upon the last coat. All finely-ground materials have about the same radiation constant; and therefore all paints having finely-ground pigments give approximately a like result.

East Kent Gas Company, Ltd.

In our advertisement columns there appears the prospectus of the above Company, which is an enterprise proposing the development of the large gas-supply area authorized by the East Kent Gas Order, 1923. It will be seen that the territory measures some 200 square miles, and comprises a population estimated at over 100,000. The Company have acquired 93½ p.ct. of the issued share capital of the Whitstable Gas and Coke Company, Ltd., and have also purchased the whole of the issued capital, amounting to £2100, of the Wye Lighting, Heating, and Power Company, Ltd. High-pressure mains are being laid in the new area with such a margin of capacity that considerable increases in business can be dealt with without further capital expenditure for this purpose. The share capital of the concern is 350,000 shares of £1 each; and there has already been issued and fully paid, excluding the present issue, £71,479. It is now proposed to issue 100,000 shares of £1 each at par. The Directors are the present Chairman of the Whitstable Gas and Coke Company, Ltd. (Mr. Henry Gann, J.P.), Mr. George Evetts, M.Inst.C.E., who is well known to our readers as a Consulting Gas Engineer, Mr. Fred. Stanley Gann, a Director of the Whitstable Company, and Mr. Robert Bruce Reeve, the Managing-Director. A considerable amount of information concerning the new enterprise will be found in the prospectus. The names given above are a sufficient guarantee of the soundness of the scheme. The well-established Whitstable Company provides a good nucleus from which to expand operations.

The New "Mechanical World."—The issue of the "Mechanical World" for July 3 inaugurates a new and enlarged series of this journal. The contents have been increased by 25 p.ct., and the scope of the journal has been widened to include industrial and commercial information of direct interest to works managers, executive officials, commercial staffs, &c.

Complete Gasification Plant.—Following an inspection of the very successful working of the complete gasification of coal plant installed by Gas and Fuel Plants, Ltd., at the Kilmacolm Gas-Works, the Directors of the Kettle, Streuchie, Kettle-Bridge, and Ladybank Gas Company have placed an order with the firm for a similar plant, capable of producing 50,000 c.ft. of gas daily.

Institution of Chemical Engineers.—The annual meeting of the Institution of Chemical Engineers this year will be of considerable importance. The third annual corporate meeting takes place in the Philosophical Hall, Leeds, on Friday, July 17, at 9 o'clock. This will be followed at 9.30 by a joint meeting with the American Institute of Chemical Engineers, a large number of the members of which, with their ladies, are visiting this country. Presidential addresses will be delivered by the President of the American Institute (Dr. Charles L. Reese) and the President of the British Institution (Sir Arthur Duckham, K.C.B.), following which a symposium on "Industrial Water Supply and Stream Pollution" will be presented. Luncheon will be given by the Institution in the Queen's Hotel at one o'clock, and the discussion on the papers read at the morning session will take place at the hotel at two o'clock—the American President being in the chair. After the meeting the American visitors, with a party from the British Institution, will journey to Glasgow, where hospitality has been offered by the City Corporation and by Messrs. Nobel Industries, Ltd. Edinburgh will also be visited, and two days will be spent in the Lake District, after which the party will proceed to Chester, where they will be accorded a civic reception on Friday, July 24, and a visit will be paid to the works of Messrs. J. Crosfield & Sons, Ltd., and the United Alkali Company, Ltd. The Institution are holding their annual dinner in Chester on the evening of Saturday, July 25; and the party will proceed to London on the following day *via* Stratford-on-Avon. After three days in London, which will be spent in sight-seeing and a visit to the British Empire Exhibition, the American guests will leave for the Continent.

REPORT OF THE SIXTH SESSION OF THE INTERNATIONAL COMMISSION ON ILLUMINATION.

Held in Geneva, Tuesday, 21st, to Friday, 24th July, 1924.

By ROBERT WATSON (Doncaster) and WALTER T. DUNN (London), Delegates of the Institution.

The Commission opened its proceedings on Tuesday morning, July 21, at the Palais Eynard of the University of Geneva under the presidency of Dr. E. P. Hyde, supported by Prof. Th. Vautier (Hon. President), Col. Kenelm Edgcumbe (Vice-President), Mr. C. C. Paterson (Hon. Secretary and Treasurer), Mr. J. W. T. Walsh (General Secretary), M. A. Filliol (President of the Swiss National Committee), and M. F. Largiadèr (Secretary to that Committee).

The countries were represented as follows:—

France.—Prof. Th. Vautier (Lyons), M. P. Bossu (Paris), M. Ch. Fabry (Paris), M. P. Fleury (Paris), M. Jouaust (Paris), M. Blondin (Paris), and M. Maisonneuve (Paris).

Great Britain.—Col. Kenelm Edgcumbe (London), Mr. H. Buckley (Teddington), Mr. Walter T. Dunn (London), Mr. Leon Gaster (London), Dr. J. Kerr (London), Mr. C. C. Paterson (London), Mr. J. W. T. Walsh (Teddington), Mr. Robert Watson (Doncaster), and Mr. J. Trezise (London).

Italy.—Sig. Bohm (Milan), and Sig. G. Semenza (Milan).

Japan.—Dr. T. Yamamoto (Tokyo).

Switzerland.—M. A. Filliol (Geneva), Prof. J. Landry (Geneva), Prof. P. Joye (Zurich), M. F. Largiader (Zurich), M. E. Payot (Geneva), Dr. K. Sulzberger, M. F. Tobler, M. W. Trub (Zurich), M. H. Wachter, M. H. F. Zangger (Zurich), and M. F. Fulpius (Geneva).

United States of America.—Dr. E. P. Hyde, Mr. E. C. Crittenden, Dr. J. W. Lieb (New York), Dr. C. O. Mailloux (New York), Mr. L. B. Marks, Mr. G. S. Merrill, Mr. A. L. Powell (Paris), and Dr. C. H. Sharp.

Poland.—Prof. Drenowski.

The President (Dr. Hyde), in his opening remarks, stated that it had been found impracticable to adhere to the original intention of holding the Session in the United States, and that they were indebted to the Swiss National Committee and its President, M. A. Filliol, for the arrangements made for the meeting in Geneva. Mr. Albert Thomas, Director of the International Labour Bureau, had given very kind co-operation and assistance in this matter.

He then expressed the appreciation of the Members of the Commission of the presence of M. Marius Stoessel, President of the Conseil Administratif de la Ville de Genève, and of Dr. Carrozzi, of the Health Section of the Labour Bureau of the League of Nations. Mr. Albert Thomas, the Secretary of that Bureau, was unable to be present.

M. Stoessel indicated the pleasure felt by the citizens of Geneva that their town should have been selected as the rendezvous of the congress, and stated that he and his colleagues would do all in their power to make the occasion agreeable. Dr. Carrozzi and M. Filliol spoke in similar terms.

Professor Vautier, Past President, and now Hon. President of the Commission, also addressed the meeting in response to the cordial welcome which had been given to him.

The President made reference to the regretted losses sustained by the Commission by the deaths of Dr. Laporte, Dr. Violle and Dr. Louis Bell.

Mr. C. C. Faterson (Hon. Secretary and Treasurer) presented a Statement of Receipts and Payments for the three years, May 1, 1921, to May 31, 1924, as follows:

RECEIPTS.

	£ s. d.	£ s. d.	£ s. d.
To balance from last account			199 16 11
,, Subscriptions for the year 1922—			
United States of America	200 0 0		
France	105 0 0		
Great Britain	113 10 0		
Italy	95 0 0		
Spain	52 10 0		
Switzerland	25 0 0		
		591 0 0	
,, Subscriptions for the year 1923—			
United States of America	200 0 0		
France	105 0 0		
Great Britain	113 10 0		
Spain	52 10 0		
Switzerland	25 0 0		
		496 0 0	
,, Subscriptions for the year 1924—			
France	105 0 0		
Switzerland	25 0 0	130 0 0	
			1217 0 0
,, Interest on Deposit Account to March 29, 1924			2 0 1
			£1418 17 0

PAYMENTS.

	£ s. d.
By Secretarial services to date	483 6 8
,, Triennial session expenses—Paris, 1921	217 19 11
,, Printing Proceedings	125 17 6
,, Postages, stationery, office printing, and miscellaneous expenses	52 12 6
,, Balance	539 0 5
	£1418 17 0

The following subscriptions for the year 1924 had been received since May 31:

	£ s. d.
Great Britain	113 10 0
Italy	95 0 0
United States of America	200 0 0

The statement of accounts was adopted by the Commission, which then proceeded with the appointment of Messrs. Mailloux, Bossu, and Largiader as the Editing Committee for the present sixth session.

On the completion of the formal business of the Commission, the following papers were submitted, the subject matter as arranged being introduced in abstract (*a*) "A primary standard of light following the proposals of Waidner and Burgess," contributed by Dr. H. E. Ives, and presented by Dr. Crittenden; (*b*) "Investigations in the realization of a primary standard of luminous intensity," by M. P. Fleury.

A Primary Standard of Light.

Dr. Ives in his paper remarked that platinum, as employed both by Violle and Siemens for standard purposes, had not proved satisfactory on trial, due in part to the difficulty of maintaining the platinum surface clean, in part to the difficulty of securing chemically pure platinum, and in part to mechanical difficulties.

In 1908 Waidner and Burgess had proposed a new standard which, while embodying the advantages of platinum, overcame difficulties due to surface contamination of the metal, and at the same time associated the standard of light with other standards of physics, specifically those of radiation. The suggestion was that the standard of light should be the brightness of a black body at the melting point of platinum.

The advantages of the standard were summarized as follows:—

(1) The temperature at which platinum melts is a fixed and reproducible point on the high-temperature scale.

(2) This fixed point is unaffected by ordinary atmospheric variations.

(3) The radiant emission of the black body is accurately defined by physical constants from which, through the least mechanical equivalent of light, the luminous emission can be derived; and

(4) At the temperature at which platinum melts, the colour emitted by the black body is closely that of the present incandescent electric lamp standards.

The means used in the investigation to realize such a standard was the construction of the black body itself out of platinum, arranged in a form convenient for electrical heating to the melting point, the form being a hollow cylinder of polished sheet metal.

From a study of the optical properties of specular reflecting cylinders, it was found that if a glowing cylinder with a slit of 10° angular opening is turned through an angle of 5°, the emission with platinum (reflecting power about 60 p.ct.) will be black to within less than one-fifth of 1 p.ct.

The paper gave an illustration and dimensions of the platinum cylinders employed, and the method of measuring the brightness of the platinum black body at its melting point.

Forty-six of these cylinders were melted, and analysis of the results obtained by the visual method showed a mean value of 55·39 c.p. per sq. cm. Twenty-three measurements made by the photo-electric method gave a mean value of 55·41 c.p. per sq. cm. The final value taken was the mean of the two sets of observations, viz., 55·40 ±·0·11 c.p. per sq. cm. as the value of the brightness of the black body at the melting point of platinum. This brightness corresponded, from a graph of the results by Hyde Forsythe and Cady, to a temperature of 2035° absolute.

The paper concluded with a recommendation of this standard described as a primary standard of light.

A PRIMARY STANDARD OF LUMINOUS INTENSITY.

In the second contribution M. Fleury stated that the work he had undertaken towards the realization of a primary standard of luminous intensity was still unfinished, and his communication would only indicate the method, and preliminary results obtained.

Initial experiences of the Violle proposition showed the difficulty in avoiding modification of the radiation emitted by platinum at the temperature of solidification. The colour of the radiation was too red to permit of precise photometric comparison with the secondary electric carbon standards in use. These defects led to the abandonment of such work. In its place it had been proposed to employ a closed chamber (enceinte) at uniform temperature, and provided with a very small aperture, thus constituting an "integral radiator," more often known under the name of a "black body." The radiation of the black body depended solely on its temperature, and not in particular on the substance of which it was made. Unfortunately in the region of 2000° to 2100° absolute (at which the colour was that of electric carbon filament lamps) the luminous brightness of the black body varied very rapidly with the temperature—about one two-hundredth per degree C.

M. Fleury proposed to use a high-temperature furnace, consisting essentially of a carbon tube heated electrically and traversed by a current of nitrogen. The furnace had been maintained several hours at 2500° without suffering alteration, and had been worked many hours at 2000° with perfect stability.

The author described the method adopted to maintain a constant temperature. Within the heated tube was placed another carbon tube, isolated from the first and heated solely by radiation. The "black body" was constituted by the region of this tube situated between a diaphragm placed full in its centre, and another diaphragm in front of the first, and pierced by a very small opening.

To fix the temperature of the black body with necessary precision, a comparison was made by means of a spectro photometer of the radiation emitted between two near and well-determined wave lengths with that emitted in the same region of the spectrum by another source, which was sufficiently stable and well defined. This source of comparison was also a "black body," but with a lower temperature, and such as could be determined with great precision. The temperature of the fusion of gold had been chosen, and the advantages claimed were dealt with in the paper.

M. Fleury, in conclusion, stated that it was proposed to realize a primary standard of luminous intensity based on the brilliancy of a black body at a temperature T determined by the following condition:

Between two determined wave lengths, λ_1 and λ_2, the radiation of the black body at T° is N times greater than that of the black body at the temperature of the fusion of gold. The ratio N (function of λ_1 and λ_2) would be chosen in such a way as to give the most favourable colour to the black body standard, and the limits λ_1 and λ_2 selected to obtain maximum precision.

U.S. PRIMARY STANDARD OF LIGHT.

Dr. Sharp, on behalf of the United States National Committee, then read the following resolution:—

"The U.S. National Committee of the International Commission on Illumination deems that it has been amply demonstrated that it is entirely practicable to realize a satisfactory primary standard of light by the utilization of the black body. Therefore the U.S. National Committee wishes to lay before the Commission for consideration the following resolutions:

That the International Commission on Illumination recommends the international adoption, as the primary standard of light, of the brightness of a black body operated under conditions which are subject to accurate specification.

That this Commission recommends to the National Laboratories that they take steps—

1. To formulate standard specifications for the construction and operation of the black body as a primary standard of light.
2. To fix upon a definitive figure for the brightness of such body expressed in international candles per square centimetre."

Dr. Sharp pointed out that a previous resolution of the U.S. National Committee called for the fixation of the temperature of the black body at the melting point of platinum. This was not excluded by the resolution now put forward, but the latter left it to the discretion of the National Laboratories.

Messrs. Fabry, Buckley, Walsh, Crittenden, Sharp, Paterson, Vautier and the President spoke appreciatively of the work done, and generally supported the resolution of the U.S. National Committee, which was adopted.

STANDARDS OF LIGHT FOR PHOTOMETRIC SENSITOMETRY.

A paper on "Standards of Light Suitable for Photometric Sensitometry," contributed by M. Jules Baillaud (Paris), was then presented by M. Fabry.

The author stated that manufacturers of photographic plates were more and more in the habit of indicating the sensibility of the plates by numbers characterizing certain properties of emulsions, and it was necessary to come to some understanding as to the adoption of the most practical method of sensitometry. In all such methods a luminous standard was employed, and in this connection the question had interest for the International Commission and for Photometrical Laboratories.

M. Baillaud referred to several standards which had been used for the purpose, but those which entered into competition were now electric and acetylene lamps. He discussed the merits of each class, and gave preference to the acetylene standard, proposed by M. Fouché, for reasons of simplicity, facility of regulation, and independence of all other standards. The paper gave details of its construction and use.

The subject was discussed by Messrs. Walsh, Crittenden, Paterson, and Fabry, their general opinion being in favour of electric lamps as simpler, and holding out hope of more definite results.

TUNGSTEN AND TUNGSTEN LAMPS.

The paper was followed by a detailed contribution on "The Properties of Tungsten and the Characteristics of Tungsten Lamps," by Messrs. W. E. Forsythe and A. G. Worthing.

Dr. Crittenden, in presenting this paper, confined him-

self, in view of the limited time available, to calling attention to the more important points raised.

The contribution was divided into two parts dealing respectively with (1) Tungsten and (2) Tungsten lamps. Both sections contained valuable and detailed information, and provide useful data for reference on the subjects generally.

The paper was briefly discussed by Messrs. Fabry and Bossu.

Special Lamp Sockets for Photometrical Work.

Tuesday morning's proceedings concluded with a paper on "Special Lamp Sockets for Photometrical Work," written by M. G. Lebaupin, and submitted to the Commission by M. Blondin.

The author claimed that the types of sockets described were of real service when in using electric secondary standard lamps it was desired to obtain great precision.

Photometric Symbols, Definitions, and Vocabularies.

Tuesday afternoon was devoted to various proposals as to photometric symbols, definitions, and vocabularies.

Col. Edgcumbe, on taking the chair, suggested that the subjects discussed should be considered in the above order, and called upon Mr. Walsh to open the proceedings with the report of the British National Committee.

Report of British National Committee.

This report covered (*a*) definitions of brightness, units of brightness, and efficiencies of electric lamps and of light sources dependent on combustion; and (*b*) symbols of photometric quantities. The latter were given as under:—

Symbols of Photometric Quantities.

Quantity.	Symbol.	Reason. (*a*)	Reason. (*b*)
Luminous flux . .	F	Widely adopted	Not in electrical symbols
Candle-power . .	I	Widely adopted	Confusion with symbol for current not likely
Illumination . .	E	Almost universal	Confusion with E.M.F. not likely
Brightness . . .	B	Widely adopted	Confusion with magnetic flux not likely
Reflection, Absorption, and Transmission ratios.	ρ	Widely used	Small Greek letters recommended for dimensionless quantities in International electrical symbols
	α		
	τ		

Mnemonics: F = Flux. I = Intensité. E = Eclairement. B = Brightness. ρ, α, τ = *r*, *a*, *t* = reflection, absorption, transmission.

The President (Dr. Hyde) stated that the American Committee were in agreement with the proposed symbols, and he thought the French Committee had used them in their paper.

On the proposition of Mr. Walsh, seconded by Dr. Sharp, these were unanimously adopted.

Commission's Report on Photometric Symbols, &c.

The report of the Committee appointed by the Commission at the Congress in 1921 was presented by M. Fabry.

The Committee consisted of Messrs. A. Blondel (France), U. Bordoni (Italy), C. Sharp (U.S.A.), and J. W. T. Walsh (Great Britain), and their report was written by M. Blondel as Chairman.

M. Blondel traversed the present position of the subject, and discussed the various propositions which had been made, finally submitting a list of the new definitions which might complete those already adopted. The latter covered luminous flux, illumination, and luminous intensity, and were agreed at the 1921 meeting.

After dealing with certain criticisms which had been advanced in connection with these three quantities, M. Blondel stated that the Committee had discussed the definitions which the Commission had referred to them for study and formulation, viz., (1) point source, (2) brilliancy, (3) factors of reflection, absorption, and transmission, (4) consumption and performance of the source, (5) mean horizontal, mean spherical, intensity, &c., (6) visibility, colour, tint, and saturation.

In the report the question of colour, tint, and saturation had been left in abeyance, being regarded as premature.

Each of the above questions was fully discussed by the Commission, and the view of the constituent National Committees was reported and commented on.

M. Blondel then advanced the positive proposals for discussion by the Commission, adopting as far as possible the phrasing suggested by the French National Committee on Illumination.

The report included a table capitulating the general proposals.

Report of American National Committee on Photometric Symbols, &c.

The American National Committee, in a contribution presented by Dr. Sharp, endorsed (as already remarked) the "Table of Symbols and Photometric Quantities" submitted by the British National Committee, and proceeded to discuss the various suggested definitions of those quantities in the light of their own proposals. The latter were embodied in a general statement (included in the paper) of proposals, which were to be submitted to the American Engineering Standards Committee in supersession of the "American Standard Nomenclature" of July 11, 1922.

The President made a suggestion that a small Committee of technicians be appointed to draft and agree the various definitions, and then to report to the Commission at the final plenary meeting. This suggestion was adopted, and the following members were appointed for the purpose:—Prof. Fabry (France), Dr. Crittenden (U.S.A.), Dr. Bohm (Italy), Dr. Joye (Switzerland), Col. Edgcumbe (Great Britain).

A general discussion followed, chiefly on the proposed definitions of point source, reflection, absorption, and transmission factors, brightness, radiance, and the units for same, most of which were ultimately referred to the above Committee.

Vocabulary of Illumination.

The Chairman (Col. Edgcumbe) then introduced the question of a Vocabulary of Illumination, two papers respectively by the French and the Italian Committees being contributed. He suggested that the Commission should deal with the general question rather than the actual terms to be defined.

French Vocabulary of Illumination.

The report of the French delegation was presented by M. Fleury. This dealt with photometric definitions and symbols in the preliminary form of a "French Vocabulary of Illumination," which it was ultimately intended to develop. The French Committee had taken as bases the definitions adopted by the Commission in 1921. Definitions of other quantities had been formulated in accordance with the propositions of M. Blondel.

The Committee suggested that the work of the International Commission at Geneva on the questions under discussion should be carried out in the order proposed in their report. The proposed vocabulary, with a table of the chief quantities and units, was included, and the Commission was asked officially to establish a table of this kind as being of great service to lighting practitioners in all countries.

Italian Vocabulary of Illumination.

The Italian Committee, through Sig. Bohm, then submitted to the Commission the "Vocabulary of Illumination (Part I.)" which the Committee had recently prepared and printed.

Sig. Bohm said that his Committee had not restricted the vocabulary to their own use, but had had it translated. He hoped that other Committees would prepare similar vocabularies, for the purpose of rendering interchange of thought possible.

The opinion was generally expressed in the subsequent discussion that the preparation of vocabularies by the different Committees would be useful, and that a small Committee should be appointed to collect and co-ordinate the work done. It was ultimately decided to appoint such a Committee, having a representative of each language, with, however, a Swiss chairman—his country

having the advantage of being trilingual (French, German, and Italian).

HETEROCHROMATIC PHOTOMETRY.

M. Ch. Fabry presided at the meeting of the Commission held on the morning of Wednesday. He first presented his report on "Heterochromatic Photometry," during which Dr. Hyde took the chair.

Mr. H. Buckley, B.Sc., then submitted a paper by Mr. L. J. Collier, M.A., Mr. F. J. C. Brookes, M.F.C., and himself, embodying a report of work carried out at the National Physical Laboratory, Teddington, during 1923-24. It was undertaken as a result of suggestions made in a note by M. Fabry on the researches which he considered it would be useful to carry out in connection with the problems of heterochromatic photometry. M. Fabry is Chairman of the Standing Sub-Committee of the International Commission on Illumination and Heterochromatic Photometry. He had pointed out that the physical aspects of the various questions involved are quite as important as the physiological and psychological aspects. One of the former, which is of very frequent occurrence in heterochromatic photometry, as well as in other somewhat related branches of science, is the energy distribution curves with respect to wave-length of the luminous sources involved. The suggestion was also made that a "black body" at a definite temperature, or a series of definite temperatures, should be utilized as a standard source of energy distribution.

It was thought that the best method would probably be to compare with that of a "black body" the spectral distribution of incandescent tungsten in the form of lamps operating under prescribed conditions, and that these could then very conveniently be used as substandards of energy distribution. The prescribed conditions would probably be specified by the potential difference across the lamp terminals, the current through the lamp, the lumens per watt, or any other condition determining a definite temperature of operation of the tungsten.

Dr. Crittenden, of the Bureau of Standards; Dr. Rayner, of the National Physical Laboratory; and the President of the Commission, Dr. Hyde, were invited to send criticisms, the result of which was that the National Physical Laboratory was requested to undertake the determination of the relation between the colour temperature and luminous efficiency of tungsten lamps. Sir Joseph Petavel (Director of the Laboratory) agreed. The results were given in the report.

The paper concluded with a reference to future work. It is proposed to continue by repeating the experiments on the graphite tubes, and by using lamps free from deposited material. Special lamps are being constructed, consisting of two single-loop filaments of considerably different lengths. It is also intended to construct a vacuum furnace, in co-operation with the Physics Department, and to continue the work on relationship between efficiency and colour temperature over as wide a range of temperature as possible.

The next paper taken was one by Mr. Jouast, on "The Employment of Absorbent Screens in Heterochromatic Photometry," of which he gave a brief summary.

RELATIVE VISIBILITY FUNCTION.

Dr. Crittenden then presented a paper on "The Relative Visibility Function," which, at the request of the Programme Committee, had been written by Mr. K. S. Gibson.

In the introduction reference was made to the paper on "The Relative Visibility Function and the Mechanical Equivalent of Light," given at the last meeting of the Commission, which contained a brief *résumé* of the results obtained in the more recent and extensive visibility investigations. It was there noted that several determinations of this important function had been made by the flicker method, as against only one by the direct-comparison method; and that, because of the apparent differences in the values of relative visibility obtained by the two methods, it would be very desirable to have a new determination by the direct-comparison method made at the United States Bureau of Standards. Through the National Lamp Works of the General Electric Company, such an investigation has recently been completed by Gibson and Tyndall, and the results published in a Bureau of Standards scientific paper. The present communication discussed the bearing of these new data on the differences in relative visibility as obtained by the two common methods of photometry, and on the choice of standard average visibility data.

The conclusion arrived at was that the values of visibility obtained by the flicker and the direct comparison methods do not certainly differ, provided the former is used under the adopted standard conditions, and the latter does not depart too widely from these conditions. In other words, a single standard visibility curve can represent the results obtained with the average eye by either method of observation, if limited to a small central portion of the retina with fairly high brightness of the photometric field.

In the discussion which followed, Mr. Walsh, Mr. Paterson, M. Jouast, Dr. Hyde, M. Fabry, Dr. Crittenden, and M. Joye took part. It was decided to refer all questions relating to heterochromatic photometry to the present Committee, and to set up a second Committee to deal with calorimetry, if deemed advisable, and this course was approved.

PRACTICAL LIGHTING AND EDUCATION OF PUBLIC, AND STREET LIGHTING.

The Commission on Wednesday afternoon was occupied with papers on two sets of subjects, viz., (*a*) Practical lighting, and methods of educating the public thereon, and (*b*) Street lighting.

The submission and discussion of the first set took place under the chairmanship of Mr. C. C. Paterson, who remarked on the fact that the three papers were the first of their kind to be considered by the Commission.

THE DEVELOPMENT OF GOOD LIGHTING PRACTICE.

The papers were presented in abstract: (1) "Practical Illuminating Engineering," by Mr. A. L. Powell (of the Edison Lamp Works of the General Electric Company, Harrison, N.J., U.S.A.); (2) "The Furtherance of Good Lighting by American Central Stations," by Dr. John W. Lieb (Vice-President of the New York Edison Company); and (3) "The Demonstration Method of Teaching Good Lighting Practice," by Mr. G. S. Merrill (U.S.A.).

Mr. Powell divided practical illuminating engineering into (*a*) educational work; (*b*) investigations and compilations; (*c*) experimental and developmental; and (*d*) specific recommendations. Included in (*a*) were articles on lighting in daily newspapers, advertisements conveying some real information on lighting practice material in school text-books, &c., talks and demonstrations before women's clubs, &c., broadcasted radio talks, window displays, special demonstrations at strategic points, and handbooks, &c., distributed to the public by the trade. Under (*b*) were treated subjects concerning light and safety, illumination and production, light and sales, light and the drawing power of show windows, effect of daylight intensity on central station load, residential lighting conditions, lighting practice in industrial plants, and lighting practice in shops and other interiors. In dealing with (*c*) the author gave attention to the engineering features of sign designs, hospital operating-room lighting, colour and spot lighting for shop windows, overcoming daylight reflections in show windows, depreciation of wall finishes, effect of dirt on the output of lighting equipment, effect of light on plant growth, and development of the reflector and lamp manufacturer's reflector. The specific recommendations set forth under (*d*) were the maintenance by the larger lamp and accessory manufacturers of staffs of competent engineers who are at the disposal of their customers. At the request of the purchaser, a lighting layout is made for his factory, office, church, store, residence, &c. In most instances a very high standard of ethics is in force, and the engineer, even though in the employ of a manufacturer, recommends the system which, in his judgment, is best suited to the user's requirements, regardless of the commercial situation.

Dr. Lieb, in his paper, stated that he knew it was useless to compare American conditions with those of other countries. He believed that there was a great development still possible in the application of electricity

to the purposes of illumination. The prosperity of the electrical industry in the United States was largely due to the careful attention which had been given to the incandescent light and to the development of the incandescent lamp in its various stages. Many companies included in their charge for electricity the price for supplying lamps. The consumer's question always was, How could he get the most candle-hours for the least money? The author urged the necessity of never forgetting that the convenience of the consumer was of paramount importance. Contact between company and consumer should always bring satisfaction to both. There was about to be inaugurated a National Research Council investigation into the value of good industrial illumination.

Mr. Merrill, in his paper, described a form of lighting demonstration and lecture which has been used very effectively in the United States to teach the fundamentals of good lighting practice—particularly as they apply to industrial and commercial lighting. The slogan "Seeing is believing" has been used very aptly in connection with them. The first demonstration room was installed at Nela Park in 1919. The lighting units were arranged on a number of different circuits, so that various lighting effects could be illustrated, and some of the units could be raised and lowered to show how the mounting height affected the uniformity of illumination. Foot-candle meters were placed on the tables, and values of illumination throughout the room were measured under the different conditions. Some of the lamps were so arranged that the reflectors could be drawn up so as to become ineffective. The change in the value of illumination, in the distribution of light, and in the appearance of the room as the reflectors were raised or lowered was very striking to those who had given but little thought to lighting subjects. Another installation was for the demonstration of industrial lighting practice. Also described were portable demonstration rooms which have been used to carry the story of good lighting to over 125 cities in the United States. Much thought was given to perfecting this equipment, to make it easy to put up and dismantle, and to pack in a small space to facilitate transportation. The author pointed out that the demonstration method had been employed very successfully in London and Paris.

The discussion of these three papers was entered into by Mr. Leon Gaster, Mr. Mailloux, M. Bossu, Mr. Robert Watson, and Mr. Walter T. Dunn.

Dr. Hyde (United States) proposed, and it was agreed, that the subject should be discussed at the next triennial meeting of the Commission.

Street Lighting in Great Britain.

Following the discussion on "Practical Lighting," M. Filliol took the chair and called on Mr. Walsh to present a paper on "Street Lighting," which was contributed by Mr. H. T. Harrison.

The author pointed out that street lighting, a service originally instituted to prevent crime, was now a factor in the prevention of accidents. It was important that some influential society should publish a series of regulations as a guide to authorities responsible for public safety and welfare. Mr. Harrison referred to work already done in this way, both in Great Britain and the United States of America, and then enumerated the relative importance of the objects which he considered should be attained in street lighting. These were as follows:—(1) Visibility of objects on the road; (2) Visibility of objects on the footpath; (3) Low brilliancy of light sources in area of vision; (4) Even illumination; (5) Minimum obstruction to traffic or pedestrians; (6) Reliability and constancy of power of lighting sources.

Visibility of objects was the primary factor, and the first consideration was therefore its achievement. After traversing the question of minimum illumination, evaluated on both horizontal and vertical planes, Mr. Harrison stated himself to be in favour of the standardization of direct illumination, it being better to illuminate the surface of an obstruction or approaching object than the surface of the road. The visibility of such obstruction was affected not only by the degree of illumination, but by the contrast between the vertical and horizontal illuminations. The author elaborated his point by examples of the effects of motor-car head-lighting. The illumination of any object standing out from the road surface to a height less than eye level required less luminous energy than would be necessary to illuminate the whole of the road surface.

The author passed to the consideration of the demands of the present day, based on the illumination required for fast motor-car traffic in comparison with the conditions which generally existed. He contrasted and pointed out the inconsistency of the advice given by the American Illuminating Engineering Society, the London "Safety First" Council, and the National Physical Laboratory, which was respectively as follows:—

(*a*) That the road illumination necessary as provided by the street lighting should not be less than 0·001 ft. candle.

(*b*) That 500 to 1,000 c.p. at a distance of 100 ft. is necessary (*i.e.*, a direct illumination having a minimum of 0·05 ft. candles or horizontal illumination of 0·004 ft. candles).

(*c*) That visibility of 200 ft. is necessary, or, say, a direct illumination of 0·1 ft. candle.

Mr. Harrison remarked on the fact that there were two different standards, viz., that proposed for motor-car traffic, and that at present existing in the streets, and was of opinion that the gap between the two demanded attention. He suggested that some standard of minimum illumination between the two should be agreed, but in order to enable responsible authorities to maintain this, it would be necessary to deal with street lighting in a different manner to what was the case at present, namely, by the adoption of the principle of lighting by projecting cones or beams. This might appear radical in principle, but only amounted to the transference of headlights from moving vehicles to fixed points at distances far exceeding the spacing which is of any value in the use of ordinary street lamps. Mr. Harrison commented on and dismissed certain possible objections.

The paper was not intended to deal with illumination of important streets, where the lighting of buildings was of importance, but rather with the urgent problem of lighting thousands of miles of roads which had become a source of danger due to fast road traffic.

Public Gas Lighting in Paris.

Two interesting papers were presented by M. Blondin, on behalf of M. Laurain, and by M. J. Mariage on the subject of "Street Lighting in Paris" by gas and electricity respectively.

M. Laurain dealt with the historical development of gas street lighting in Paris, starting with an installation in Rue de la Paix in the year 1830. The progress of public lighting was indicated by a chart showing the increase each 10 years in incandescent lighting points up to 50,000 in the year 1924, and in lower horizontal candles up to 12 millions in the same year. Of the 50,000 points, about 5,500 were of the high-pressure type.

The incandescent gas lighting under normal pressure was almost entirely obtained by means of upright burners, with an hourly consumption of 80 or 150 litres (2·8 or 5·3 c.ft.), the consumption being controlled by governors. Lighting and extinguishing were effected by clock controllers, thereby requiring half the attention previously necessary. Clock controllers were very satisfactory, an inspection during five consecutive weeks showing failures of less than one per thousand.

In the near future public gas lighting under low pressure would be appreciably improved by the employment of inverted cluster burners, the advantages of which M. Laurain explained.

The hourly consumption per mean candle below the horizontal which did not drop below 1·6 litres with ordinary burners, fell to 1·10 with inverted cluster burners.

The rapid evolution in traffic methods had found a satisfactory solution of the consequent problem of needed increased illumination in the employment of high-pressure

gas lighting. The Paris Gas Co. had in 1900 adopted this method in the Champ de Mars. M. Laurain briefly referred to the extension of this method, and gave a chart showing the progress made up to Dec. 31, 1923, there being at this date 5532 points with a total lighting power of over 9 million candles. The sizes of lamps vary, and consist of 4000 c.p. (3 mantles); 2000 c.p. (3 mantles); 1200 c.p. (2 mantles); 1000 c.p. (2 mantles); 500 c.p. (1 mantle); and 250 c.p. (1 mantle). The hourly gas consumption per mantle was as follows: 4000 c.p. lamps 750 litres; 2000 and 1200 c.p. lamps, 400 litres; 1000 and 500 c.p. lamps, 350 litres; and 250 c.p. lamps, 175 litres.

The hourly consumption per mean lower horizontal candle below the horizontal was between 0·6 and 0·7 litre.

All the injectors were tested, stamped, and periodically replaced.

M. Laurain dealt in detail with the question of calorific power and flame temperature, and furnished a formula by which the latter might be ascertained. This was as under:—

$$T = \frac{\Sigma q \; Qr}{\Sigma pc}$$

T = Flame temperature in degrees centigrade.
Σq = The calories disengaged per second by the combination of a determined weight of gas with oxygen.
Qr = The calories stored per second by recuperation in the gas and primary air.
Σpc = The sum of the products of the weights "p" of the divers products of the combustion per second by their respective mean specific heats "c" at constant pressure.

From an inspection of this formula it could be seen that it is possible with a combustible of relatively low calorific value to obtain a high temperature, on condition that Σpc itself is small. This condition is realized by carbon monoxide in the gas, the presence of which had by recent administrative regulations been limited to 15 p.ct. The presence of this gas was therefore, according to the formula, favourable to incandescent lighting, since it permitted of a high temperature in spite of a low calorific value.

The paper included particulars of the conditions under which the high-pressure lighting was effected, and concluded with some statistics of the different sizes of lamps in use.

Public Electric Lighting of Paris.

The contribution on the public electric lighting of Paris by M. J. Mariage was equally interesting, but does not call for abstract in a report intended for those interested only in gas illumination matters.

M. Mariage sketched the historical development of electric lighting in Paris, and gave full particulars of the lamps employed in the city. The paper concluded with certain comparisons suggesting the superiority of electricity compared with gas on the score of the cost and of polar distribution of light. It was, however, agreed by the members of the Commission that these should be deleted from the final publication, since they were not concerned with competitive methods as such.

Signal Lights for Town Traffic.

A further interesting contribution was also sent by M. F. Cellerier, this being on new methods of signal lights intended to assist in the regulation of town traffic.

Discussion on Street Lighting.

The submission of papers on street lighting was followed by a discussion, in which MM. Filliol (Chairman), Bossu, Lieb, Dunn, Zollikofer, Sharp, Watson, Payot, Paterson, Gaster, Mailloux, and Carozzi took part. The discussion chiefly centred on the advisability of legal enactments governing the minimum of illumination which should be adopted for street lighting purposes. Various suggestions were made, but it was recognized that the Commission could do no more than give general advice. It was decided that the question of street illumination should be placed on the agenda of the next Plenary Meeting of the International Commission.

On Thursday morning, under the presidency of Dr. Sharp, a report of the International Committee on Lighting in Factories and Schools, which had been prepared by Mr. L. B. Marks, as Chairman of that Committee, was considered.

Lighting of Factories and Schools.

The reporter first alluded to the communication he had presented at Paris in 1921, in which lighting legislation in the United States had been discussed with special reference to (*a*) factories, mills, and other work places, and (*b*) school buildings. Codes of factory lighting were then effective in six states—Pennsylvania, New Jersey, New York, Wisconsin, Oregon, and California. Since that time, factory lighting codes have become effective in four other States—Ohio, Oklahoma, Massachusetts, and Washington—making ten in all, having an aggregate population of 43 millions. The third report of the Departmental Committee on Lighting in Factories and Workshops was issued in 1922 by the Home Office of Great Britain. The rules in that report relating to intensity of illumination and glare, and the rules, regulations, and recommendations of the American Standard Code of Lighting Factories, Mills, and other Work Places, were now submitted for discussion.

In considering the question of illumination required, the need for legalized minimum requirements was pointed out. The plan of including suggested lighting standards for "recommended practice" for different classes of work has proved a good one, and has been carried out in all American codes. But it is one thing to suggest, and another to insist. In the United States it has been found that suggestion goes a long way, but insistence is often necessary for the protection of the eyesight of the workmen. Great Britain prescribes:

In defining adequate illumination for processes carried on in factories and workshops, definite legal minima shall not at present be imposed; but a specification of minimum standards of illumination as "recommended practice" for (*a*) fine work, and (*b*) very fine work, shall be issued. The standard of illumination for processes grouped under (*a*) shall not fall below 3 foot-candles, and for processes grouped under (*b*) shall not fall below 5 foot-candles.

Passing on to the consideration of avoidance of glare and distribution of light, Mr. Marks observed that no practical difficulty has been found in applying in practice the rule relating to illumination intensity required on the space and at the work. Factory inspectors have found it a simple matter to use an instrument such as the foot-candle meter to check lighting standards in different parts of the country. Unfortunately, however, no such simple method has been available to determine compliance with the glare rule. In the United States an attempt has been made to classify commercial light sources from the standpoint of glare, taking into account five principal factors of glare, as follows: (1) Brightness of source; (2) total volume of light; (3) location in the field of view; (4) contrast with background; and (5) time of exposure. The British Committee take cognizance of only two of these five causes of glare. No cognizance is taken of the total candle-power in the direction of the eye; of the contrast with the back-ground; or of the time of exposure of light sources within the field of vision.

Referring to the code of lighting for school buildings, Mr. Marks said that in 1923 the Illuminating Engineering Society, in conjunction with the American Institute of Architects, undertook the revision of that Society's Code of Lighting School Buildings, under the auspices of the American Engineering Standards Committee. The resulting revised code was officially approved by that Committee in June, 1924, and is now known as the American Standard. As to illumination required, the minimum foot-candles for lighting school buildings are, in some cases, higher for the same general class of work than those on the American standard factory code. In the glare, diffusion, and distribution of light divisions, the school code rule on avoidance of glare is the same as that set forth in the American standard factory code. With a view to minimizing accidents on stairways of school buildings, a new clause has been introduced in the revised code as follows: "The nosing of treads on all stairs used as exits should be such as to show the edge of each step by contrast when viewed as in descending." Regarding exit and emergency lighting, as a safety precaution in school lighting it was thought desirable to

specify that the exits from classrooms and auditoriums must be indicated by adequately illuminated signs in all rooms or auditoriums having an illumination less than one-tenth foot-candle.

Regarding inspection and maintenance, the factory lighting code does not contain a special rule on these items, but suggestions and recommendations on them are included in that section of the code devoted to the discussion of the rules. The rule relating to illumination required specifies the minimum foot-candles that shall be maintained on the space or at the work. The inspector is therefore not directly concerned with the question of renewals of burned-out lamps, cleaning of globes and reflectors, or cleaning of windows and sky-lights, except to the extent that lack of proper maintenance may result in a reduction of the effective illumination to a level below the mandatory minimum. The case of the school lighting code is somewhat different. Though the school authorities are held responsible if the illumination falls below the minimum specified in the code, it was thought desirable to insert in the school code a special rule relating to inspection and maintenance.

To Mr. Marks' report was appended a copy of the rules, regulations and recommendations for the lighting of factories and schools. It was submitted for discussion as a basis of international agreement.

Resolutions embodying these recommendations were then put before the Commission and discussed.

A paper on the Work of the Commission on the Lighting of Factories and Schools, of the French National Lighting Committee, by M. Maurice Leblanc, was reviewed by M. Bossu. In it, after general considerations had been discussed, details were given of good lighting in various industries. The qualities of natural and artificial lighting were touched upon, and the paper concluded with a few words on the importance of adequate lighting of exit passages.

Industrial Lighting in England.

Mr. Leon Gaster (Hon. Secretary of the Illuminating Engineering Society) then presented in abstract his paper on "Some Further Developments in Industrial Lighting in England." Its scope included references to the two reports issued shortly before the war by the Joint Committees of the Illuminating Engineering Society. These reports were commended to the attention of school managers and Local Education Authorities in the 1912 report of the Chief Medical Officer of the Board of Education.

The author expressed the opinion that the most promising basis of international action was to promote agreement on principles of lighting, leaving to the various countries the decision as to how best they can be applied in practice. A sketch was given of developments of industrial lighting in England during the past few years, and reference was made to the following recommendation relating to the avoidance of glare, contained in the second Home Office report:

> Every light source (except one of low brightness) within a distance of 100 ft. from any person employed shall be so shaded from such person that no part of the filament, mantle, or flame is distinguished from the shade, unless it be so placed that the angle between the line from the eye to an unshaded part of the source and a horizontal plane is not less than 20°, or in the case of any person employed at a distance of 6 ft. or less from the source not less than 30°.

Considerations resulting from the application of this recommendation were reviewed. The author declared: "We have as yet no simple and positive means of determining when an installation is 'glaring.' Even the widely-quoted limit of 5 foot-candles per square inch, based apparently on the average brightness of a white sky, is somewhat difficult to substantiate scientifically, for it is evident that the expanse of white sky overhead is somewhat different from an isolated light source of small dimensions. It is also now recognized that glare is something of a matter of contrast between a source and its surroundings, and that in some cases the candle power of a source, apart from its brightness, may be a factor of importance."

The third report of the Home Office was analyzed. It was shown to deal mainly with the question of working illumination. The Committee issued a schedule of industrial operations divided into the classes of "fine" and "very fine." The report suggests that lines of future research should include: (1) The collection, for every purpose concerned, of a sufficient number of observations to give some indication of the best existing practice; and (2) experimental research with the object of discovering the conditions of illumination desirable on physiological and psychological grounds. Ample proof is now forthcoming of the relation between lighting and production and safety. It therefore seems reasonable to expect the chief industries to co-operate in this work, and assume partial responsibility for a scheme of research on the lines indicated—possibly through the Research Associations, where they exist.

In England a considerable amount of useful work has been done by the Industrial Fatigue Research Board, who have shown, in the case of several industries, how inadequate illumination causes fatigue and prejudicially affects output. In the cotton and silk industries, the average output by daylight is 10 per cent. better than it is by the present artificial lighting conditions. The National Institute of Industrial Psychology have also conducted some useful research work. They have shown that a higher candle power from the miner's lamp enabled a group of workers to produce more coal in a given period. It is to be hoped that the Committee on Illumination, established under the Department of Scientific and Industrial Research, will be able to promote useful researches of this kind, undertaken with the aid of the industries concerned. This applies to the experiments at present being conducted on the lighting of printing works. Other problems will in due course be relegated to sub-committees, each of which will contain, not only lighting experts, but architects, physiologists, and others interested. Co-operation will also be invited from the industry investigated. In the National Physical Laboratory there is also an institution admirably adapted to the carrying out of scientific tests on specific problems by which general investigations on conditions in actual practice require to be supplemented. The willing co-operation of employers and workers is necessary for the solution of the problem of improving industrial lighting. Generally speaking, the first step is to gain the confidence of the workers in the industry studied, and so secure their willing co-operation in the tests.

In conclusion, the author expressed the view that minimum legal standards of illumination should be based primarily on considerations of safety and health. Supplementary recommendations, serving as an indication of good practice, should only be fixed after consultation (where possible) with the joint councils of the industries concerned. Naturally, the economic value of increased illumination should also receive due consideration; and, where the circumstances justify it, values considerably higher than those representing "good practice" may be recommended, in the interest of efficient production. Industrial lighting is now a subject of international interest, as was aptly illustrated by the International Labour Office of the League of Nations in 1924. The author hoped that the present meeting of the International Commission on Illumination would result in the initiation of further researches, and that at forthcoming meetings there would be further substantial progress to record.

At the last moment a lengthy and highly technical paper entitled "Some Researches on the Phenomena of Glare," by M. U. Bordoni, was introduced, and was reviewed by M. Bohm.

In the discussion of the foregoing communications, Mr. Marks, Mr. Dunn, Mr. Gaster, Dr. Kerr, Prof. Fabry, M. Bossu, Colonel Edgcumbe, and Dr. Hyde took part.

International Agreement and Standardization.

"The Field for International Agreement and Standardization in Illumination" was treated in a paper by Mr. H. Buckley, B.Sc., Secretary to the British National Committee. The author remarked that one of the most striking characteristics of recent years had been the very marked extension of interest in the problems of illumination; and the time therefore seemed particularly appropriate at this, the second technical meeting of the International Commission on Illumination, to consider what

part the Commission could take in assisting progress in illumination matters by judicious and well-considered international agreement and standardization.

Types of standardization in the following fields were considered: (1) Of international agreement on the fundamental basis of illumination; (2) of standardization of illumination materials; and (3) of international agreement on illumination legislation. As to the first, the important possibility of realizing such a standard as the candle power of 1 sq. cm. of a black body at the melting point of platinum was mentioned. The author stated that the problems presented by the study of candle-power standards, flicker photometry, average visibility, and energy distribution must be solved before any further progress in photometry is possible—particularly as modern developments on high-temperature radiations and spectral radiations seemed likely to accentuate to a very great extent the existing difficulties.

Nomenclature, definitions, and symbols offered another field for agreement. The Commission would also be performing a very useful function if they could define, either in spectrophotometric terms or colour terms, what is meant by daylight; and further, if the different standards of daylight which are suitable for various purposes were clearly defined.

The measurement of the absolute transmission and reflection ratios of diffusing materials required carrying out with a view to international agreement. The use of diffusing materials—as lamp bowls and as coverings for walls—brought the problem to the notice of the illuminating engineer. The Ulbricht sphere had been used to determine these characteristics, with the surprising result that the reflection ratio of magnesium carbonate had been found to be about 98 p.ct., and not 88 p.ct., as had been previously assumed.

With respect to the standardization of illuminating materials, electric lamps had hitherto been the subject of specification in most countries, at any rate as far as concerned the vacuum lamp. The standardization of gas-filled lamps had not yet progressed equally. In this field, it was scarcely possible to expect any international specification; but it would be of great advantage if a universal method of rating lamps could be agreed, *e.g.*, in mean spherical candle-power or lumens.

The glassware used in shades and reflectors required standardization or specification in various directions. As to dimensions, there were numerous types of glass fittings made in which the dimensions, particularly of the rim where attachment to a metal fitting occurred, differed from type to type by amounts which seemed perfectly arbitrary. The large diversity of such glassware was due partly to the possibility, before the war, of obtaining it cheaply from foreign countries in which low-paid labour was employed. The cutting-off of supplies during the war led to considerable difficulty, and glassware became increasingly made in Great Britain, France, and America; so that manufacturers obtained more control of dimensions. The production of coloured glass was touched upon. As transport became more and more rapid, the question of the production of coloured lights and glasses to given specifications assumed an increasing importance.

Mr. Buckley concluded his paper with some remarks on international agreement on lighting legislation. The success of the Illuminating Engineering Society of New York in the practical adoption of their Industrial Lighting Code by several States was a good omen of what conscientious work, under the auspices of the Commission, might achieve. Lighting legislation was, or would be, mainly concerned with factory and school lighting, street lighting, automobile headlights, &c. The work of standardization should proceed slowly, and with deliberation; for it should be remembered that premature standardization or agreement might be attended with disastrous results in preventing progress. Nor should there be over-standardization to the exclusion of industrial requirements and expression. True standardization and agreement meant merely improving and bringing into harmony that which required improvement or which need not exhibit discordance.

Mr. Paterson, Mr. Walsh, M. Vautier, and Dr. Hyde spoke in the discussion of the papers.

FINAL PLENARY MEETING.

The final and plenary meeting of the Commission on Friday, under the presidency of Dr. Hyde, was devoted to the consideration and adoption of various resolutions resulting from the work done at the technical meetings, to the election of officers, and to the submission of the triennial budget of expenditure.

All the resolutions were in French, the official language of the Commission.

The following is a translation taken from the Annual Report of the National Illumination Committee of Great Britain and indicates the nature of the decisions arrived at.

(1) The International Commission recommended for international adoption, as the primary standard of light, the brightness of a black body operated under conditions subject to accurate specification, and further recommended that the National Laboratories take steps

  (1) To formulate standard specifications for the construction and operation of the black body as a primary standard of light;
  (2) To fix upon a definite figure for the brightness as a function of the temperature of such body, expressed in international candles per square centimetre.

(2) A Sub-Committee was appointed to draw up a vocabulary dealing with Illumination.

(3) The Commission provisionally recommended certain values for the visibility factor.

(4) The Sub-Committee on Heterochromatic Photometry was asked to include in its work the study of the properties of absorbent screens.

(5) The following definitions and symbols were adopted.

  (*a*) TRANSMISSION FACTOR of a body is the ratio of the flux transmitted by the body to the flux incident upon it.
  (*b*) ABSORPTION FACTOR of a body is the ratio of the flux absorbed by the body to the flux incident upon it.
  (*c*) REFLECTION FACTOR of a body is the ratio of the flux reflected by the body to the flux incident upon it.
  The flux reflected according to the laws of regular reflection is called regular reflected flux, and the corresponding reflection factor is called the factor of regular reflection. The flux diffused, *i.e.*, that sent out in directions other than that of regular reflection, gives the diffuse reflection factor. The total reflection factor is obtained by considering the whole of the flux returned by the body.
  (*d*) TOTAL FLUX of a source is the flux emitted by that source in all directions.
  (*e*) THE UPPER HEMISPHERICAL FLUX of a source is the flux emitted by that source above the horizontal plane passing through its centre.
  (*f*) THE LOWER HEMISPHERICAL FLUX of a source is the flux emitted by that source below the horizontal plane passing through its centre.
  (*g*) THE MEAN SPHERICAL INTENSITY of a source is the average value of the intensity of that source in all directions in space.
  (*h*) THE MEAN UPPER HEMISPHERICAL INTENSITY of a source is the average value of the intensity of that source in all directions above the horizontal plane passing through its centre.
  (*i*) THE MEAN LOWER HEMISPHERICAL INTENSITY of a source is the average value of the intensity of that source in all directions below the horizontal plane passing through its centre.
  (*j*) THE MEAN HORIZONTAL INTENSITY of a source is the average value of the intensity of that source in all directions in the horizontal plane passing through its centre.

(*k*) The Reduction Factor of the Mean Spherical Intensity of a source is the ratio of the mean spherical intensity to the mean horizontal intensity.

(*l*) The Efficiency of a Source is the ratio of the total luminous flux emitted to the total power consumed. In the case of an electric lamp it is expressed in lumens per watt. In the case of a source depending upon combustion it may be expressed in lumens per thermal unit per unit of time.

(*m*) Visibility Factor for monochromatic radiation is the ratio of the luminous flux to the corresponding energy flux.
The relative visibility factor of a monochromatic radiation is the ratio of the visibility factor of that radiation to the maximum value of the visibility factor.

(*n*) Brightness. The brightness in a given direction of a surface emitting light is the quotient of the luminous intensity measured in that direction by the area of this surface projected on a plane perpendicular to the direction considered. The unit of brightness is the candle per unit area of surface.

SYMBOLS.

Luminous Flux	F	. .	Reflection	ρ
Candle Power	I	. .	Absorption, and	α
Illumination	E	. .	Transmission ratios	τ
Brightness	B	. .	Visibility Factor	κ

(6) It was decided that questions relating to street lighting should be considered at the next session and the National Committees were asked to study the subject and to transmit their communications to the Central Office at the earliest date possible.

(7) The report submitted by the Chairman of the Advisory Committee on the Lighting of Factories and School Buildings was recommended as a basis for regulations or recommendations on lighting of factories and school buildings.

(8) The National Committees were asked to study the question of glare from motor-car headlights, and to send their communications to the Central Office in ample time for the next session.

Following the consideration and final adoption of the foregoing resolutions, the Commission decided that the next meeting, in 1927, should be held in New York, the actual date (probably in September) to be left for subsequent settlement.

The following Officers and Committees were elected for the period of three years:—

President: Dr. E. P. Hyde (U.S.A.).

Vice-Presidents: M. Semenza (Italy), M. Rouland (France), Col. Edgcumbe (Great Britain).

Hon. Secretary and Treasurer; Mr. C. C. Paterson.

The thanks of the Commission were expressed to these gentlemen for their past service.

The position of General Secretary was not an elective one. Mr. Walsh was asked, and consented, to again take this position, a tribute of appreciation being paid to him and his helper, Miss Simmons, of the National Physical Laboratory.

Sub-Committee on Heterochromatic Photometry.

Chairman	...	Prof. Fabry (France).
Great Britain	...	Dr. Rayner.
United States	...	Dr. Crittenden.

Sub-Committee on Definitions and Symbols.

Chairman	...	Prof. Blondel (France).
Italy	...	Prof. Bordoni.
United States	...	Dr. Sharp.
Great Britain	...	Mr. Walsh.
Switzerland	...	M. Joye.

Sub-Committee on Factory and School Lighting.

Chairman	...	Mr. Marks (United States).
Great Britain	...	Mr. Gaster.
Italy	...	Prof. Bordoni.
Switzerland	...	M. Trub.
France	...	M. Leblanc.

Sub-Committee on Automobile Headlights.

Chairman	...	Dr. Sharp (United States).
Italy	...	Sig. Semenza.
Great Britain	...	Col. Edgcumbe.
France	...	M. Bossu.
Switzerland	...	M. Payot.

Sub-Committee on Vocabulary.

Chairman	...	Prof. Joye (Switzerland).
France	...	M. Fleury.
Italy	...	Prof. Bordoni.
Great Britain	...	Member to be nominated.
America	...	Member to be nominated.

Sub-Committee on Calorimetry.

Mr. Smith	...	(Of the Optical Section of the National Physical Laboratory).
Dr. Priest	...	(Of the Bureau of Standards at Washington).

A third member to be nominated.

Mr. Paterson, as Treasurer, next presented the estimate of expenditure for the next three years, viz.:—

	£	£
Cost of Geneva meeting	200	
,, ,, printing	250	
	—	450
Secretarial expenses (1924-27)		600
Miscellaneous		100
		£1150

Alterations in the rates payable by way of annual subscriptions had been considered, and were recommended by the Executive Committee as follows:—

50s. to 35s. per million inhabitants of any one country, with a maximum of £140 instead of £200, and a minimum subscription of £20 instead of £25.

Mr. Paterson estimated that on these bases the annual income would be:—

		£	s.	d.
France	39 million inhabitants	68	5	0
Great Britain	44 ,, ,,	77	0	0
Italy	39 ,, ,,	68	5	0
Switzerland	(minimum)	20	0	0
United States	(maximum)	140	0	0
		£373	10	0

or £1120 10s. for the 3 years.

The recommendation was adopted.

Mr. Robert Watson (Doncaster) introducing this report said: I have the honour of presenting on behalf of Mr. Dunn and myself, as delegates, a report of the Sixth Session of the International Commission on Illumination, which was held in Geneva in July last year. Though the report is somewhat lengthy, I think it must be considered relatively short when it is remembered that no less than 29 or 30 communications were submitted to the Convention in the space of 3½ days. In view of the fact that they were followed by discussions in English and French, you can easily understand that we were worked very hard, having to start soon after 9 in the morning and finishing very rarely before 6 o'clock in the evening. The members are referred to the original papers for any information on the subjects in which they are particularly interested, as it is obvious that in a report of this description one can only give an indication of the ground that is covered. The representatives numbered about 40, covering gas, electricity, and physical interests; and they came not only from our own country but from France, Italy, Switzerland, the United States, Poland, and as far away as Japan. I am glad to say that there was very little dissension between us. Indeed, there was a great deal of amity and good feeling, which was in keeping with the traditions of a city which is celebrated for conferences, and which is the habitat of the League of Nations. The papers were concerned with photometric dimensions and symbols, heterochromatic photometry, factory and school lighting, and automobile lighting. These were subjects which came before the 1921 conference, and were relegated to committees in the various countries for consideration. One or two new features, however, were introduced, and there was a natural transition from what I might term the scientific or theoretical considerations of illumination to the practical application of lighting generally. The report gives, to those who are interested in the finances of the Commission, some particulars as to how the money is found for running it, and it also shows that the financial account for the last three years will allow of a reduced subscription for the different countries. Following the agreement on what is known as the International Candle some time in 1913, decisions were arrived at at the 1921 Conference as to certain photometric

quantities such as luminous flux and intensity. At the meeting last year further progress was made, when definitions covering brightness, reflection, absorption, transmission, and the like were formulated; and these are included in the report before you. I should like to say that some credit is due to the representatives of our own national Institution, the National Physical Laboratory, and to Mr. Walsh in particular, for the work they did in the crystallization of the results of the various Committees. The work of the Commission also covered the attempted establishment of what is termed the primary standard, because, as you all know, the preservation of the International Candle is made by secondary standards, principally incandescent electric lamps, which are kept in the three national laboratories in England, France, and the United States. Heterochromatic photometry, or photometry of lights of different colours, with its difficulties, again came up for discussion; and these papers afforded very useful points for study for the Committees which have these matters in hand. The submission of three papers on practical illuminating engineering, and methods of publicity among all classes of consumers, which refers to the use of the various illuminants which are available to the public, was something new; and these papers obviously furnish an opportunity for the international exchange of opinions and views on the subject, and were found to be exceedingly useful. The papers submitted were given by delegates from the United States, and, I am afraid, referred particularly to electric lighting. Nevertheless we have reason to know that these methods are adopted by gas undertakings in the United States, and are not peculiar to the electrical industry. I venture to suggest, also, having studied these papers very carefully, that our own country is not behind the United States in matters of this description, and that the larger undertakings, and many of the smaller ones, are acting much on the same lines suggested in these papers, and, in some cases, I think we even go one better. Your representatives at that meeting took the opportunity of drawing attention to the work done by our own organization, the British Commercial Gas Association, and the work done generally in this country in that connection. The study of illumination required in factories and in schools was also proceeded with, and a good deal of data now exist to which reference can easily be made should any of our members have occasion to design installations for buildings of that character. In connection with street lighting, this again was a subject which was new to the Commission as a matter for study. The various national illumination committees have been asked to pursue the study of street illumination standards, and to be prepared to discuss them at the next Conference, which is to be held in New York in 1927. I may say that the British National Committee on Illumination already have this work in hand. It has been delegated to a Sub-Committee working under the *ægis* of the British Engineering Standards Association, and this Committee have been sitting during the last few months; but I am not in a position to present any report of that Committee, in as much as the work is not yet completed. I may say, incidentally, that the work actually consists in a classification of streets and thoroughfares in order of illumination requirements, in the study of the need for higher illumination standards for these streets compared with the work done in 1913 by a similar Committee—the need being greater, in view of the increased amount of fast moving traffic—and the desirability of increasing the height of the light source in order to get a greater distribution of light along the ground and to avoid the possibility of glare. I mentioned at our Institution meeting in 1921 that Italy and Switzerland were not particularly interested in gas lighting, because they have enormous water power which they use for the generation of electricity; and their representation on the Committee is not particularly strong. I was sorry to find that at last year's Convention the United States and France seemed to be feeling that the interest in gas illumination is declining generally, and that they need not themselves be concerned much in the work on that subject. As a matter of fact, there were no gas representatives from the United States at the Conference, and they seemed to be losing interest in gas lighting. At the final meeting of the Executive Committee of the Commission, of which I happen to be a member, when this question of loss of interest in gas lighting came up, I made a statement—and I think I was justified in making it—that Great Britain, at any rate, had not lost interest in gas illumination, and that we looked upon it as being still an important part of our business. Though the use of gas may be increasing in the field of heating, we feel, I told the meeting, that there is still a considerable future for gas lighting, even as there is still some field for the use of candles for lighting. I can only state that I know that some of our fittings firms are exceedingly busy making fittings, which is an indication that we desire to keep in touch with gas illumination. I trust personally that this Institution will not lose interest in this work, whatever may be the view of our confrères in other countries. One has to remember that the Commission was, after all, originally started by the gas interests at an International Meeting in Paris. I should like briefly to refer to the extreme courtesy and great hospitality which we received from the members of the Swiss National Committee, headed by a gentleman whom we all respect and like, M. Filliol, the Secretary of the Swiss Gas and Water Association. Yesterday M. Zollikofer was present, and I asked him whether he would be good enough to make some reference, in connection with this report, to gas practice in Switzerland; but he told me he would be unable to be present. It might, therefore, be of interest to know that, in spite of the enormous advantages of the electrical interests in that country, the gas industry in Switzerland is holding its own as regards cost, and—what is still more interesting—in spite of the very small proportion of gas lighting they have, the use of gas is increasing even in that country.

The PRESIDENT: I am sure gentlemen you will agree with me that we are very much indebted to Mr. Watson, not only for bringing this report before us this morning and making this very interesting statement, but also for attending the various conferences, and for all that he has done in reference to the use of gas for illumination in that connection. I can assure Mr. Watson, on behalf of this Institution, that we have not lost interest, and that it is not our intention to lose interest, in the use of gas for illuminating purposes. ["Hear, hear."] In my opinion there is a great future, and I believe that people will come back to the use of gas for lighting in the future. I can substantiate, if necessary, the remarks he made with reference to Switzerland. In Switzerland they are able to get electrical energy very cheaply, because they have water power which is used for the generation of electricity. They are using what they call "white coal." We in England have no waterfalls of any extent, and we have to use coal to generate electricity. Therefore, the conditions are not the same; but irrespective of this, when I was over in Switzerland last year, the Swiss gas engineers informed me at a conference that their output was going up substantially. During the war the use of gas in Switzerland was reduced, because of the difficulty of getting coal; but now they are able to get coal, and the gas companies there are beginning to prosper, because the make of gas is increasing considerably. I will now ask for any observations upon the report.

Mr. H. DAVIES (Chesterfield): With regard to the use of reflection for improving street lighting, I do not wish to draw any comparisons between electricity and gas; but it seems to me that the electricians are making some strides with regard to the utilization of the value of reflection for illuminating purposes, and I think we ought to work on somewhat similar lines. I do not say that the electrical people are exactly on the right lines, because we have had some experiences in Chesterfield which confirm my opinion that they are not altogether right. At the same time experience has taught me that there is a good deal of value in reflection; and I shall be glad to know if the Committee have considered that point.

Mr. WATSON: In reply to Mr. Davies, I may say that the Sub-Committee sitting at the present time on street lighting, which consists of representatives of gas and electricity and the lamp makers, have this point in mind. There is no doubt about it that our friends the electrical engineers are making a good deal of what they term directive lighting, the directive effect being due to the use of reflectors, which perhaps may be peculiarly suited and better adapted to electric lamps. I believe at the same time, however, that gas lamp makers are also paying attention to that point; and I can assure Mr. Davies and you that, so far as I am concerned, as your representative on the Street Lighting Committee, I shall not lose sight of the point which Mr. Davies has raised.

Mr. W. J. LIBERTY forwarded the following written communication:

I take this opportunity of bearing my testimony to the time and labour given by Mr. Watson, and of emphasizing the wish that the Institution will not go back on the good work to which it has put its hand, but will continue to support financially, and by representation, the work of the Commission, more particularly, as far as the street lighting is concerned, where there is much work yet to be done in the Sectional Committees, likewise in the Committees of the British Engineering Standards Committee, dealing with this matter. The abridged report presented by Mr. Watson is full of useful information, and should be read quietly and carefully by every member of the Institution, as it could not possibly be discussed in the limited time at the disposal of the meeting. The newly-formed Institution of Public Lighting Engineers have this matter of street lighting, in its connection with the Illumination Commission, naturally before them, and have two representatives upon the Street Lighting Sectional Committees of the British Engineering Standards Association, of which I am privileged to be one.

As we are being reminded at the forthcoming Conference at Brighton that over 90 p.ct. of the roads and streets in this country are not sufficiently well lighted to ensure the safety of the public, and that in the case of street lighting it will be found that, with few notable exceptions, the position remains very much the same as before the war, it will be seen how necessary it is that this section of the work of the Commission should go on. It concerns every gas engineer, for Great Britain has its roads and streets in the cities and the countryside largely gas illuminated. This, coupled with the rapidly-increasing mechanically-propelled traffic, thrusts upon those responsible the necessity for safeguarding life, as well as brightening our streets, and protecting property. I therefore echo Mr. Watson's plea for an increased interest in the subject by the members of the Institution and those connected with public lighting generally. Our hearty thanks are due to Mr. Watson for the assiduity and intelligence that he has brought to his task.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Potential Heat Value of the Electrical Unit.

SIR,—We were interested to read Mr. H. J. Hailstone's comments on the varying figures used by different authorities in expressing the thermal content of a unit of electricity.

Some time ago the British Commercial Gas Association endeavoured to establish the authoritative figure; and in view of the variations current at that time, we made official inquiry of the Institution of Electrical Engineers, who informed us that, while they knew of no authoritative figure, it was the practice of the Institution to use the figure of 3411.

We published this information in the "Bulletin," with a suggestion that the gas industry, at least, should adhere to it, so as to secure a common practice.

J. C. WALKER, Secretary,
British Commercial Gas Association.

28, *Grosvenor Gardens, Victoria, S.W.* 1,
July 2, 1925.

Bitumen v. Tar.

SIR,—I think it only fair to send you the enclosed copy letter, which I am forwarding to the "Surveyor," *re* tar and bitumen.

W. J. HADFIELD, City Surveyor.

Town Hall, Sheffield,
June 22, 1925.

[ENCLOSURE, addressed to the Editor of the "Surveyor."]

SIR,—Probably few of your readers will have seen an article which appeared in last week's issue of the "GAS JOURNAL," attacking Sir Henry Maybury as an advocate of foreign bitumen, as against home-produced tar.

I think every road engineer ought to see the article; and, if you are good enough to publish this letter, I suggest you should at the same time reprint one or two paragraphs from the "GAS JOURNAL" containing the attack in question.

If Sir Henry is advocating the use of bitumen as against tar, when tar can suitably be used, it is news to me, although I suppose my dealings with the Ministry of Transport are as extensive as those of most road engineers. My object, however, is not to defend Sir Henry Maybury, but my own profession. Is it supposed that the hundreds of engineers who, during recent years, have gone in for bitumen, and practically the whole of the road authorities concerned, have made the change over without considering very carefully which was the best and most economical material? If so, someone ought to adopt the advice of the late Lord Fisher, and "sack the lot."

Everyone concerned, including the gas and tar interests, knows that bitumen is serving a purpose to-day which can never be served by tar. Beyond that there is the question of price. I have before me the prices of tar from 1914 to the present time, which make very interesting reading. I will not trouble you with too many of them, but will merely mention that tar, which could be bought in 1914 for 52s., in 1920 for 75s., cost in 1923 as much as £8 18s. 6d. per ton. Of course, since then the price has fallen materially; but, in the meantime, those who organized the rise did a good deal towards killing the goose that had been laying the golden eggs.

W. J. HADFIELD,
City Surveyor.

Town Hall, Sheffield,
June 22, 1925.

[This letter is dealt with in our Editorial columns.—ED. "G.J."]

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for July 1.]

Nos. 16,015-16,613.

BRAY A., and BRAY & CO., LTD., G.—"Gas burners." No. 16,625.

COMPAGNIE POUR LA FABRICATION DES COMPTEURS ET MATÉRIEL D'USINES À GAZ.—"Gas meter." No. 16,337.

DEMANN, W.—"Hydrogenation of tar oils." No. 16,523.

GIBB, D. M.—"Gas-heated water boilers." No. 16,316.

GIBB, D. M.—"Plug taps, cocks, &c." No. 16,317.

HAUSMEISTER, P.—"Safety devices for gas pipes, &c." No. 16,561.

JONES, F. W. SALISBURY-.—"Distillation of coal." Nos. 16,061, 16,062, 16,063, 16,064.

MOELLER, J. F. L.—"Coking and distillation of carbonaceous materials. No. 16,349.

PARKER, C. H.—See Jones, F. W. Salisbury-. Nos. 16,061, 16,062, 16,063, 16,064.

PARKINSON STOVE COMPANY, LTD.—See Gibb, D. M. Nos. 16,316, 16,317.

RUSSELL, G. D.—"Gas fires." No. 16,459.

WHEELER, F. C.—See Russell, G. D. No. 16,459.

WOOD, P. N.—See Russell, G. D. No. 16,459.

WOOD, RUSSELL, & CO.—See Russell, G. D. No. 16,459.

Three men were injured on Thursday last while at work on the new gasholders which are being erected for the Birmingham Gas Department at Aston Church Road. Four riveters were at work inside a holder, and were in the act of hauling themselves up to the staging on a cradle. One side of the tackle gave way, and three of the men were thrown 30 ft. to the bottom of the holder. John Horney fell on to the forges and received serious burns, and Alfred Bayliss sustained severe general injuries.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

Gas Light and Coke Company Bill: Returned from the Commons, with the amendments agreed to.

The following Bills received the Royal Assent on June 30: Gas Light and Coke Company, Kilmarnock Gas and Water Provisional Order.

Gas Regulation Act.

A copy was presented of a draft Special Order proposed to be made by the Board of Trade under section 10 of the Act, on the application of the Carlisle Corporation.

The draft Special Order relating to the Colchester Gas Company was approved on the motion of Viscount Peel.

HOUSE OF COMMONS.

Progress of Bills.

Gas Light and Coke Company Bill: Lords amendments considered, and agreed to.

Mansfield Corporation Bill: Read a second time, and committed.

The petitions presented by the Bournemouth Gas and Water Company against the Poole Harbour Bill and by the Southern Railway Company against the Uckfield Gas and Electricity Bill have been withdrawn.

Low-Temperature Carbonization.

Viscount SANDOWN asked the Secretary for Mines whether, in view of the development that has been effected in the process of low-temperature carbonization of coal, he would consider obtaining assistance for its commercial development, either through the safeguarding of industries scheme or by some other means, in order to improve the state of our coal trade and to secure a home supply of oil to meet our national requirements.

The SECRETARY FOR MINES (Colonel Lane-Fox) replied that he could not add anything at present to what was said recently by the Prime Minister.

Mr. PALING asked if any firm in this country had made application for assistance in any shape whatever to develop the low-temperature carbonization process.

Colonel LANE-FOX stated that there had been two cases before the Trades Facilities Committee, but he had not heard the actual and final result.

Mr. PALING further asked if the process of low-temperature carbonization had gone far enough now to warrant recommending that help should be given in development of it.

Colonel LANE-FOX said that it depended on the process to which reference was being made. There were various processes, in various stages of development, and any help that could be given to these processes he certainly hoped would be given.

Gas Undertakings (Employment).

Mr. R. MORRISON asked the Minister of Transport whether, in order to reassure the employees of gas undertakings throughout the country, who fear the Government propose to subsidize the electrical industry, thereby handicapping and causing unemployment in the gas industry, he could give any indication of their proposals or their attitude upon this specific point.

The MINISTER OF TRANSPORT (Colonel Ashley) said he was not in a position to add anything to the replies previously given on this subject.

Mr. MORRISON: Cannot the right hon. gentleman make any statement, to allay the anxiety of thousands of gas workers throughout the United Kingdom, that, whatever the Government proposals are, they will not prejudice their employment?

Colonel ASHLEY: Yes; no electricity proposals will entail anything that need perturb gas employees.

STATUTORY GAS COMPANIES (ELECTRICITY SUPPLY POWERS) BILL.

The House of Lords sitting in Committee on Thursday, July 2, considered this Bill. The Earl of Donoughmore was in the chair.

Clause 1 was agreed to, but an amendment was moved by Lord Raglan to clause 2, which provides for capital powers to statutory gas companies for electricity purposes. His amendment, which was to leave out "also by Electricity Orders" and insert "by Special Order under the Electricity (Supply) Acts, 1882 to 1922," was accepted.

Lord BANBURY moved, after "electricity purposes," to insert "if no other company has electricity powers in their area." He said that the object of this amendment was to safeguard any powers which Parliament might have granted to an electricity company before this Bill become law. It was very important, if electricity was to be developed, to secure the confidence of investors when they placed their money in an electricity company authorized by Act of Parliament, and, subject to certain penalties as to dividends and as to the date of redemption by a local authority, that they should feel certain that until the redemption took place they should not be subjected to competition by another company whose powers had also been granted by Parliament. There had been many attempts to safeguard the various public interests with regard to electricity companies. He understood from the promoters that one of their reasons for not accepting the amendment was that it was unnecessary, because no Electricity Commissioners would ever put it into force. If that was

so, he saw no reason why the amendment should not be inserted in the Bill. Another reason for their objecting was that possibly an electricity company which had powers might not take advantage of or exercise them. In the circumstances it would be perfectly easy for a gas company in that area to come to Parliament (as twenty-four or twenty-five gas companies had already done) and ask for powers. It seemed to him that this was a circumstance not likely to occur, and he thought it was far better to secure confidence among investors by making certain that when a person put money into an undertaking authorized by an Act of Parliament something would not later on be done to prejudice that investment.

Lord RAGLAN did not think it was anticipated that the Electricity Commissioners would often have to exercise powers such as those referred to by Lord Banbury in moving the amendment, but there were certain cases in which it might be advisable to allow them to do so. As regards what had been said, that it was very rare for a company which had obtained powers from Parliament to supply electricity not to exercise them, he was informed that it did happen. There were cases which had not been mentioned. One of them was that in some areas electricity supply companies and gas companies were co-terminous. In those cases, if the amendment were inserted, it would lead to difficulties. There was a further case which he understood actually happened. A statutory gas company and an electricity supply company in a certain area had arranged that the gas company should take over one part of the area and the electricity supply company another part. In such circumstances as those it was felt that the amendment would unduly cramp the activities of the Electricity Commissioners, and that there would be no corresponding public advantage. He therefore asked the House not to accept the amendment.

The FIRST COMMISSIONER OF WORKS (Viscount Peel) understood that it was not the practice of the Electricity Commissioners to invest two separate bodies with general distribution powers over the same area, and the effect of passing the amendment would be that it would prevent gas companies from applying for powers in regard to districts within a power company's area. It would be observed that Lord Banbury's amendment was directed only against companies, and that apparently he did not mind gas companies infringing the area of authority of the local authorities. There was no reason why they should be differently treated.

The amendment was, by leave, withdrawn.

The next two amendments were in the name of Lord Raglan, who moved to leave out [p. 1, lines 17 and 18] the words "by any such Orders or," and [line 18] at the end insert "or any Order having the force of an Act of Parliament." The amendments were agreed to.

Lord BANBURY moved to add to the clause: "Provided that the principal moneys secured by any mortgage debenture or debenture stock authorized by any such Special Order shall rank after any mortgage debenture and debenture stock of any such company existing at the time such Order was made." He explained that this addition was to protect the existing debenture stock of any company receiving power to borrow further money.

The amendment was accepted.

It was agreed to leave out clause 3 which was as to the effect of Orders, and to omit from Clause 4 the expression, "Electricity Orders means Special Orders granted under the authority of this Act."

The remaining clause was agreed to.

LEGAL INTELLIGENCE.

Alliance and Dublin Consumers' Gas Company.

Circuit-Judge Drompole, Dublin, had at hearing an application by the Alliance and Dublin Consumers' Gas Company for compensation in respect of loss of 17,712,576 c.ft. of gas following the leakage of mains at the Four Courts and in Sackville Street, following the Republican revolt against the Free State Government in June and July, 1922.

The claim submitted was for £5200 for loss of gas, and £23 for gas consumed by the Republicans while in occupation of the Four Courts; £288 for the destruction of meters; and £218 for work and materials involved in carrying out the necessary repairs, &c. The quantity of gas lost had been arrived at by Pole's formula.

On behalf of the Minister of Finance (Mr. Blythe) it was denied that there had been any abnormal leakage of gas at either of the places indicated, and lack of evidence from resident shopkeepers in Sackville Street was dwelt upon.

Mr Thos. Martin, architect, giving evidence for the Ministry, expressed the opinion that there was escape of gas to the extent claimed by the applicants.

The Judge said there must have been an escape of gas, but he could not rely on Pole's formula. He reserved judgment.

Gas Prices at Shipley.—The Gas Committee of the Shipley Urban District Council have had under consideration the question of making an allowance to consumers of large quantities of gas, and decided to recommend the following allowances: To consumers of 10,000 c.ft. and over per half-year, in one establishment, a rebate of 1d. per therm upon the total consumption. To consumers of 500,000 c.ft. and over per half-year, in one establishment, a rebate of 1d. per therm upon the first 500,000 c.ft. and 1½d. per therm upon the consumption in excess of that figure. To consumers of 1,000,000 c.ft. and over per half-year, in one establishment, a rebate of 1d. per therm upon the first 500,000 c.ft., 1½d. per therm upon the second 500,000 c.ft., and 2d. per therm upon the consumption in excess of one million c.ft.

MISCELLANEOUS NEWS.

COMMITTEE ON INDUSTRY AND TRADE.

Evidence on Behalf of the Gas Industry.

Mr. D. MILNE WATSON, D.L., Governor of the Gas Light and Coke Company, and President of the National Gas Council, giving evidence before the Committee on Industry and Trade last Wednesday, stated that the gas industry was one of the most important key industries of the country, supplying a commodity of prime necessity and of common use in the vast majority of the homes of the people. It was the chief conservator of the first national asset—viz., coal supplies—as it applied the latent heat in the coal to practical purposes with greater efficiency than any other industry. It provided bye-products of the greatest value to the country, and was the basis of the aniline dye industry. It was essential to a very large number of trades and industries; gas being employed by 3000 distinct trades for industrial purposes. It provided a large range of disinfectants; and its provision of materials from which high explosives were made was an important factor in winning the war. The capital invested in the industry was over £160,000,000; and the coal carbonized last year was 17,202,000 tons.

The gas industry consisted of both company and municipal undertakings. It was controlled by legislation in respect of the price that might be charged for gas and the quality or standard of the gas supplied. The dividends in the case of companies were strictly regulated by means of sliding-scale or maximum price and dividend clauses.

Although gas was the primary product resulting from the carbonization of coal, residuals were of the utmost importance. The revenue received from them was set against the cost of coal; and the more gas undertakings received from residuals, the cheaper, in effect, gas became. The industry was experiencing considerable difficulty in this respect, owing to the demand for residuals having fallen off, and the price obtained for them having in consequence slumped.

With regard to the sale of tar in this country, a considerable market existed for prepared tar as a road-making and road-surfacing material. Mr. Milne Watson contended that, unfortunately both from the point of view of the industry and the nation, the Government had not sufficiently fostered the use of British tar for road construction and road surfacing in this country. It was submitted that it was unwise at the present juncture to import materials from abroad when British materials were available, and that it should be the definite policy of the Government to see that tar was used in the construction, maintenance, and surfacing of roads in preference to imported materials.

Another bye-product which had in the past enjoyed a good market abroad was sulphate of ammonia. The export, as represented in tonnage, had not decreased compared with before the war; but the price obtained was considerably less. The large increase in the production of synthetic ammonia in other countries—especially in Germany, France, Norway, Italy, Belgium, Holland, Spain, and Czecho-Slovakia—together with the increase in the production of sulphate of ammonia at home was the chief cause for the fall in price. The export of such residuals as carbolic acid, liquid carbolic acid, naphthalene, prussiate of potash, and prussiate of soda had been heavily handicapped by the imposition of foreign tariffs—particularly in the United States of America.

The heavy slump in the residual market, combined with higher wages, had recently necessitated the price of gas being raised in a large number of cases; but the average increase in the price over pre-war was still only in the neighbourhood of 50 p.ct. It was submitted that this was very creditable, having regard to the high price that had to be paid for many raw materials, and the large increases in wages, amounting, generally speaking, to about 90 p.ct. above pre-war. Hours had also been shortened, and other concessions costing much money in the aggregate had been granted.

It was recognized in the industry that the importance of research work could not be exaggerated. Such research work was carried out under the ægis of the Institution of Gas Engineers. Investigations had been, and would continue to be, carried out with regard to such questions as national conservation of coal, improvement of methods of carbonization and general efficiency of manufacture, &c. Large individual undertakings were also engaged in investigating problems of importance to the industry—such as the best methods of carbonization.

Although low-temperature carbonization had not yet been found a commercial proposition, the gas industry was continuing to investigate the subject most carefully, and would naturally adopt low-temperature carbonization if, and when, it was found to be a commercial success. The industry did not overlook the necessity for technical education of those engaged in it. Schemes had been evolved, and were working satisfactorily.

Mr. Milne Watson claimed that the future of gas in this country was full of great hope and promise, provided that the industry was afforded fair play. The industry had had to face the greatest difficulties and the greatest prejudices, and by its own efforts had achieved success. Suggestions had been made that the gas industry's rival and competitor—the electricity supply industry—should be aided in some form or another by the State. Any artificial stimulus given to the electricity supply industry must *pro tanto* react to the detriment of that other great national industry, the gas industry.

LABOUR AND CO-PARTNERSHIP.

With regard to labour, the relations between employer and employee in the industry were very cordial. The industry employed 102,000 workers. The industry believed in granting holidays to its workers; and it had been agreed with the trade unions that each worker who had completed a year's service in the industry should be entitled to a holiday of one normal working week with pay.

At the end of the war the gas industry definitely adopted the principle of collective bargaining. The employers' and workers' representatives agreed to give Whitleyism a trial; and in April, 1919, the

National Joint Industrial Council for the Gas Industry was formed. This Council settled all questions pertaining to labour—*e.g.*, national increases and decreases in wages, hours, overtime, Sunday pay, holidays, &c. The country was split-up into districts, and each district had a Regional Gas Industrial Council consisting of employers' representatives from that district and trade union leaders in the area. These Regional Councils settled any dispute or difference which might arise with regard to a particular undertaking or a particular class of employees. They also carried out the zoning and grading of gas undertakings—*i.e.*, placing each undertaking in its appropriate category and zone in the district, for wage purposes.

The gas industry was the pioneer of the co-partnership movement, and many companies had adopted this principle. A large number of undertakings, both municipal and company, had instituted superannuation and pensions schemes.

In conclusion, Mr. Milne Watson urged that it was essential that the burden of taxation should be lightened; that consumers should be urged to purchase British goods in preference to foreign goods; that self-reliance in industry should be encouraged; and that the citizens of this country should concentrate on the present position with the same self-sacrifice and enthusiasm with which they faced the years of the war. In this way the country would once more regain its prosperity. The idea at the present time that the effort that was required was to be made by the Government *qua* Government was too prevalent, and was a dangerous fallacy.

Evidence regarding the co-partnership scheme of the South Metropolitan Gas Company was also given by Mr. H. T. MANLEY (one of the Employee Directors of the Company) and Mr. H. W. MIDDLETON (one of the employees). These witnesses explained that the gas industry was the pioneer of the co-partnership movement, the first scheme having been propounded by the South Metropolitan Company in 1889. That Company's scheme had worked satisfactorily ever since; and the witnesses emphasized the importance of the goodwill and harmonious relations engendered by co-partnership, as leading both to greater efficiency and to the avoidance of industrial unrest. The Co-Partnership Committee established by the Company had proved most valuable in dealing with all matters affecting the well-being of the workers—including an accident fund, a provident society, an unemployment insurance scheme, a superannuation fund, and arrangements for hospital treatment of members and their dependants. The witnesses thought one of the most important parts of the scheme was the provision by which, since 1898, employees had had the power to elect three of their own number to places on the Board of Directors. These Employee Directors attended all Board meetings, and shared with the other Directors the responsibility and duties pertaining to the conduct and control of the Company's affairs.

BAHIA BLANCA GAS COMPANY, LTD.

Presiding at the eighteenth ordinary general meeting of the Company (which was held last Thursday at Dashwood House, Old Broad Street, E.C.), Mr. J. M. MACMORRAN, the Chairman, referred with regret to the death last year of Mr. A. M. im Thurn, who had been connected with the Company almost since its inception.

Turning to the business of the Company during the year 1924, he said the revenue account showed a loss of £7472, making the total deficit £64,835. The actual working loss in Bahia Blanca for the year under review was £144, which compares with £1156 for the previous year. Taking the revenue account for 1924 as a whole, the result was £1167 better. The Auditors had called attention to the fact that depreciation had never been charged on the capital assets; but it was evident that sooner or later the Company must be reconstructed, and the question would be dealt with then. More gas had been sold than in 1923; but owing to reduced charges, less was received for it. The Directors continued to receive satisfactory reports, to the effect that lower prices and more efficient appliances together were encouraging the public to take a greater interest in gas for cooking and heating; but they were not making rapid headway. In fact, the working during the year had been uneventful—resolving itself, as it had, into an uphill fight for fresh consumers. Though progress was slow, they knew that this was through no fault of the Manager (Mr. A. M. Hunter) and his staff. The Board were, indeed, quite positive that Mr. Hunter was the ideal man for the job. A new station meter had been very useful in dealing with the question of unaccounted-for gas. It had been in operation for nine months during 1924; and the percentage of unaccounted-for gas for the year was 9·15, which was the lowest in the history of the Company. The figure for 1923 with the old meter (which proved to be fast) was 15·94 p.ct. The mains had been carefully tested, section by section, by which means it was possible to trace where the greatest leakage was taking place. Lieut.-Colonel R. T. Harper, O.B.E., F.C.A., who had other important interests in Argentina, had been elected a Director of the Company. The Chairman concluded by expressing the appreciation of the Board of the splendid and enthusiastic work done during the year by Mr. Hunter and his staff.

The report and accounts were adopted.

GAS REGULATION ACT APPLICATIONS.

The following notice has appeared in the "London Gazette" regarding applications to the Board of Trade under the Act.

SPECIAL ORDER.

Seaford Gas Company, Ltd.

To authorize the Company to supply gas in scheduled areas, to use specified land for gas purposes, to furnish gas on a calorific basis, to fix prices and dividends, and for other purposes.

MOBILE ADVERTISEMENT.

The accompanying photographs, for which we are indebted to Mr. C. S. Shapley, the Engineer and Manager of the Leeds Gas Department, show two motor wagons which took part in a procession of decorated cars on the occasion of "Children's Day," which is a big function in Leeds.

The modern gas kitchen attracted large crowds, for both the cooker and the boiler were in operation. It is interesting to note that these cars were awarded the second prize in the advertisement class.

YOUNGER GENERATION AND DOMESTIC ECONOMY.

Brilliant Work by Elementary School Children.

So much has recently been said in criticism of present-day teaching methods in the elementary schools that the very high standard of work received by the British Commercial Gas Association in the Essay Section of their Tenth Annual Fairy Gas Competition is worthy of note. The results of this popular competition, which comprised an essay on "The Gas Meter and Household Economy," for children from 10 to 16 years of age, and a Painting Section for children under 10, have just been announced, and include the award of two £50 scholarships in addition to cash prizes.

Of the 180,000 forms distributed in connection with the competition, not a few were returned from secondary schools; but it was a pleasant surprise to the judges—more especially to those of them who were accustomed to university and public school teaching only—to find that the work of the elementary schools was as excellent as that of the secondary schools, and that the standard throughout was very high. The Special Committee of Judges who made the final scholarship awards included the Hon. Sir John Cockburn, K.C.M.G., Dr. Lydia M. Henry, of King's College for Women, London, and Dr. Percy Schofield, Principal of Loughborough Technical College.

MANCHESTER GAS DEPARTMENT REPORT.

The Gas Committee of the Manchester Corporation have submitted to the Council their report for the year ended March 31, together with an abstract of the accounts.

The following is a summary of the items of income and expenditure, the figures for the previous year being also given for the purpose of comparison.

1924.			1925.	
£	£	INCOME.	£	£
	1,093,161	Gas, &c.		1,030,614
		Residuals, &c.—		
292,547		Coke	292,571	
123,262		Tar	64,272	
27,417		Sulphate of ammonia	15,920	
	443,226			372,763
	1,305	Sundry receipts		1,680
	1,537,692			1,405,057
		EXPENDITURE.		
		Manufacture—		
577,290		Coal and oil	580,427	
		Carbonizing wages, maintenance of plant, &c.	195,417	
197,771				
40,408		Renewals	44,476	
	815,469			820,320
		Distribution—		
		Maintenance of plant, salaries and wages, &c.	156,391	
155,047				
67,136		Renewals	74,907	
	222,183			231,298
	80,411	Rents, rates, &c.		80,753
		Management, collection, &c.—		
35,254		Salaries and wages	36,157	
		Less—Receivable from Electricity Committee for collection of accounts	*5,554*	
5,780				
29,474			30,603	
42,954		Other charges	43,517	
	72,428			74,120
	1,190,491			1,206,491
	347,201	Gross profit for the year		198,566
92,683		*Less*—Interest on loans, &c.	90,575	
39,800		Income-tax	45,946	
	132,483			136,521
	214,718	Net profit		62,045

The quantity of gas sold was 6,840,370,000 c.ft. Notwithstanding the large increase of nearly 8 p.ct. in the previous year, and the exceptionally mild weather prevailing throughout last year, the sales have been well maintained, and a further increase of 3 p.ct. secured. The average price realized was 2s. 11·16d. per 1000 c.ft. (equivalent to 7·81d. per therm), as compared with 3s. 2·63d. for the previous year; the difference being attributable mainly to the reduction of 3d. per 1000 c.ft. in the price of gas, which took effect as from March 25, 1924. The demand for cookers, fires, and high-power lighting installations continues to be most satisfactory. The maintenance by the Department of consumers' burners and appliances is also appreciated, and is becoming more general. As regards the reduced tariff adopted for gas used for manufacturing, &c., purposes, the number of approved applications to be placed on this scale received up to March 31 last was 1083, in respect of which the consumption was 907,913,500 c.ft., or 13·27 p.ct. of the whole.

The cost of coal and oil carbonized was as follows:

—	Gross Cost.	Less Income from Residuals.	Net Cost.
	s. d.	s. d.	d.
Last year, per 1000 c.ft. sold	1 8·86	1 1·08	7·28
Previous year " "	1 8·87	1 4·02	4·85

The difference represents an increase in net cost to the Committee of £69,259. The average gross cost of coal only, inclusive of cost of handling, was 24s. 6·21d. per ton, as compared with 24s. 0·56d. for the previous year. There has been a marked reduction in the income from residuals, the price for tar having fallen considerably.

The amount transferred from revenue to the credit of renewals account was £120,706, which, together with the interest on the fund, made a total credit for the year of £125,731. The sum of £129,976 15s. 4d. was expended during the year. The balance to the credit of the account is now £163,219.

Additional loan capital has been raised to the extent of £240,000 during the year for the new works at Partington, extensions at the Bradford Road Works, and for distribution purposes. The expenditure for the year amounts to £193,420, of which sum £21,708 was provided out of profits, and the balance out of loans. The total capital outlay at March 31 was £4,850,786, the loan debt in respect of which was £1,904,722, or 39·27 p.ct. Important contracts amounting to £175,942 have been entered into during the year in connection with the Partington Works. These embrace the railway sidings, erection of coal bunkers, &c., foundations for gasholder and new roads, and gasholder and tank. Considerable progress has been made with the main pipe line which will connect these works with the Manchester supply.

The balance of sinking fund unapplied at the commencement of the year was £84,350, and the amount provided out of revenue for the year was £123,090. Loan debt to the extent of £119,552 has been redeemed, leaving a balance of £99,223 not actually applied to the redemption of debt.

BIRMINGHAM GAS DEPARTMENT.

Reply to Recent Criticisms.

The Birmingham Gas Committee have prepared a long statement for the City Council in reply to recent criticism, and they confirm their recommendation for an increase in the price of gas.

They point out: (1) That the increase in the price of gas proposed was for the purpose of making good any loss in the financial year ended March 31, and was necessary to meet the continued fall in the values of residual products during the current financial year. (2) That, had the advance been approved, it would have applied to the consumption of gas after the June readings of the meters—*i.e.*, to gas consumed during the quarter ending September next—and would therefore operate during nine months only of the current financial year, and have provided an increased revenue of approximately £152,000—a sum which falls very far short of the anticipated loss of revenue from residuals. The income from residuals represented 74·13 p.ct. of the cost of coal in the year ended March, 1924, and 69·64 p.ct. in the year ended March, 1925, and in the latter year contributed £772,699 to the Department's revenue, equal to one-third of the total income. It is estimated that the effect of the slump which has to be faced in the current year will be to reduce further the revenue from this source by over £200,000. (3) That any advance in the price sanctioned by the Council cannot be ante-dated. Therefore, if the proposed new scale is approved, it will be necessary to take a special reading of the meters; otherwise, if it only comes into operation from and after the ordinary September readings, the expected revenue would be reduced from £152,000 to £112,000 over the current financial year.

Dealing with the points of criticism, the report states, in reference to the excessive staff and overhead charges of the Department, that in the opinion of the Committee, the staff, covering, as it does, five different gas-works, and dealing with 200,000 consumers, and over 1000 miles of mains in an area of 130 square miles, is not excessive; and they point out that the question had been carefully reviewed by the Salaries and Wages Committee. It was true there had been an increase of salaried men, and a considerable reduction in the number of men employed in gas-making. This had entailed an increase in the number of technical supervisors. The change was more than justified by the remarkable increase in efficiency obtained from the modern type of gas-making plant. Works salaries and management charges only amounted to 1¼d. per 1000 c.ft. of gas sold.

Criticism (says the report) is often expressed in the Council, and occasionally in the Press, with regard to the apparent redundant staff employed in the gas fittings and inspection department, but the Committee remind the Council that it is absolutely essential for the safety as well as the satisfaction of the gas consumer that every precaution should be taken in the fitting of all gas appliances. Inspection has been cut-down in every way consistent with safety and satisfactory service.

As to gas being supplied under cost price, the report states that this is so only for gas used for public lightnig, and in the districts of certain other authorities—Wednesbury and Darlaston—under agreement made over forty years ago.

A lengthy explanation is given as to why a manufacturer using 1 million c.ft. for power is charged 5d. per 1000 c.ft. more than one using 5 million c.ft., the purport of which is that the concessions given to the larger consumers—necessary to obtain their business—are more than justified by the contributions obtained towards the total cost. The Committee give two justifications for lower charges for gas for power than for lighting: (1) The great advantage of a regular day load; and (2) competition with electricity and oil and producer gas plants. With regard to capital expenditure from revenue, the Committee point out that in six years £877,366 has been transferred to the special maintenance account; but they appreciated that in the present period of trade depression it is impolitic to continue the past practice, financially sound as it may be.

Reduction in Price at Newbury.—The Gas Committee recommend that, commencing from the meter readings for the quarter ended June 30, the prices of gas be reduced as follows: Ordinary consumers, from 11d. to 10½d. per therm (10d. with discount); prepayment consumers, from 1s. to 11d. per therm.

Sunderland Rotary Club.—"The History of the Coal Gas Supply" was the title of an address given recently to the Sunderland Rotary Club by Mr. Norman S. Cox, Secretary of the Sunderland Gas Company. Mr. Cox traced the history of the gas supply from its small beginnings to the great industry it is to-day, with an invested capital of upwards of £160,000,000. Nearly 20 million tons of coal, coke, and oil, he said, were now carbonized annually. At the same time probably more than twice as much coal was being burnt in its crude form; and they looked forward to the time when these proportions would be reversed. Dealing with the Sunderland supply, Mr. Cox pointed out how favourably this town was placed for the manufacture of gas, through its accessibility to the source of the raw material, and how it had availed itself to the utmost extent of this advantage. Progress had been the watchword of the Sunderland Gas Company, and the make of gas had increased from 151 million c.ft. in 1864 to 1004 millions in 1904, and 1542 millions in 1924.

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

The firmer tone which has developed in consequence of the uncertainty in the industry has been maintained. Though no greatly increased volume of business has been put through, the downward course of prices has been arrested. On the other hand, there is still no disposition on the part of buyers to fix up beyond the end of this month, the idea naturally prevailing that prices must eventually come down.

There is a certain amount of demand for the second half of this month for stocking purposes, but stocks are nearly everywhere so high already that there is not likely to be any shortage of supplies. Buyers on the Continent are not likely to be affected by any possible stop, as supplies from other sources will be plentiful.

Gas coals are reasonably firm at late prices, and Wear Specials quote 18s. 9d. f.o.b., and best qualities about 18s. 6d. Seconds range from 15s. 6d. to 16s., according to quality. Unscreened coking makes have been in rather better demand at 15s. 6d. to 16s. 6d., and coaling station requirements have helped Durham unscreened bunkers, best qualities having improved to 17s. 6d.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

There has been a little movement in the market. Householders are showing a livelier appreciation of the advisability of making sure of their supplies against the autumn, and this has given a stiffening tendency to certain grades of coal which are in special demand and the output of which is limited. Such advances as have been notified by collieries have not much more than a local significance, however. With a few exceptions the market for industrial fuel remains singularly lethargic. Industrialists who have been unable to take full advantage of the slump through having stocked heavily as a precaution against contingencies which did not arise are disinclined to insure against risks now—in fact, the general conclusion is that what will be will be, and that in any case matters cannot get much worse in the heavy trades. The improving turnover in house coal is not sufficient to restore the balance as regards slacks and D.S. nuts. For these descriptions of fuel values have still a slight upward tendency. Some hard coals, such as are used in the annealing process, are in stronger request. Owing to the low ratio of the output in relation to general industrial supplies prices have appreciated, in some instances by as much as 2s. a ton. Deliveries of gas coal are being kept up to the limits of storage capacity. There is only a very slow sale for blast-furnace coke, and the market is on the weak side.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

The negotiations between the owners and men appear to have resulted in a deadlock, and although this has had an appreciable effect on the market, prices have not altered to a great extent. House coals are in demand for stocking purposes, and a certain amount of business has been done in industrial fuel at figures slightly above current rates. Gas coals still work spasmodically, although it is anticipated that reduced figures will be available after the present trouble is over.

Export shows an increased value, with hards in the neighbourhood of 21s. 6d. f.o.b., while furnace coke has also appreciated from recent values.

Prices at Hull at the week-end were (f.o.b. usual shipping ports): South Yorkshire.—Hards, Association, 20s. 6d.; screened gas coal, 18s.; washed trebles, 19s. to 19s. 6d.; washed doubles, 17s. 6d.; washed singles, 16s. 3d. to 16s. 9d.; washed smalls, 14s. to 15s.; unwashed doubles, 17s.; rough slack, 11s. 6d. to 12s. 6d.; smithy peas, 18s. 6d. to 20s. West Yorkshire.—Hartleys, 18s.; screened gas coal, 17s. 6d.; washed trebles, 18s.; washed doubles, 16s. to 16s. 6d.; washed singles, 15s. to 15s. 6d.; washed smalls, 14s. to 15s.; unwashed trebles, 16s. to 17s.; unwashed doubles, 12s. to 13s.; rough slack, 11s. 6d.; coking smalls, 10s. to 10s. 6d. Derbyshire and Nottinghamshire.—Tophards, 20s. 6d. to 21s. 6d.; washed trebles, 17s. to 17s. 6d.; washed smalls, 13s. 6d. to 14s.; rough slack, 11s. 6d. to 12s. 6d. Yorks, Derbys, and Notts.—Screened steam coal, 18s.; gas coke, 19s. to 20s.; furnace coke, 19s. to 20s. per ton. All prices are nominal owing to the labour situation.

West Bromwich Gas Accounts.—The annual statement of accounts of the West Bromwich gas undertaking was presented to a meeting of the Town Council on Wednesday last, when it was shown that the total capital expenditure on the undertaking amounted to £269,963, towards which provision for redemption had been made to the extent of £225,353. The outstanding loans amounted to £143,287, and the net indebtedness on the undertaking, after deducting £94,277 accumulated in the loans fund redemption account, amounted to £49,009. The total income for the year amounted to £104,648, as compared with £110,244 the previous year—a decrease of £5596. The net income from sales of gas amounted to £67,147, while the total quantity of gas sold was 424,673,126 c.ft.; this being an increase of 15,727,173 c.ft. on the sales of the previous year. The amount received from the sales of gas fittings, the sale and hire of gas cookers and fires, maintenance of burners and mantles on consumers' premises, and hire of lamps of high candle-power, amounted to £5130—an increase of £970. The total expenditure on the revenue account amounted to £92,393, as compared with £95,644 for the previous year. The gross profit was £12,254, compared with £14,599. The net profit was £3274.

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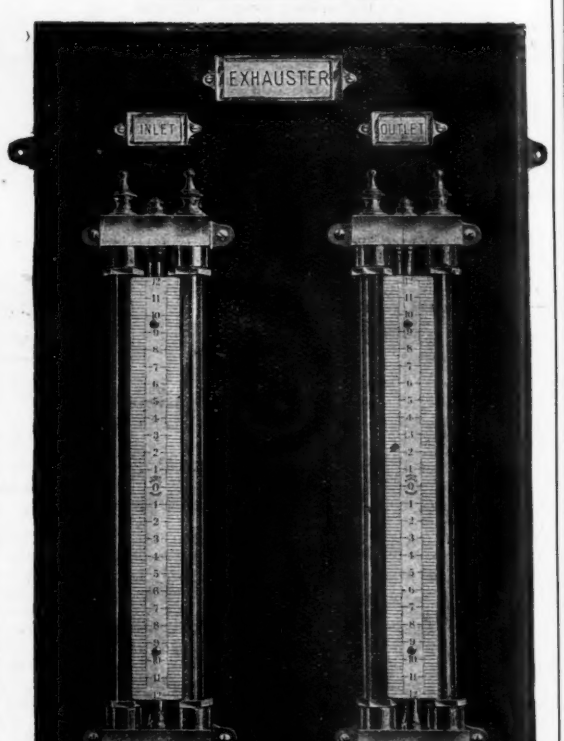

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STOCK MARKET REPORT.

BROKERS were decidedly happier last week by reason of an increase in the number of buying orders. Gilt-edged investments, in spite of the attraction of British and Colonial new issues still being quoted at a discount, were firmer. It is anticipated that prices will be maintained; but it remains to be seen whether the wish is father to the thought. The prevailing optimism is, however, somewhat tempered by the anxiety prevailing in the labour markets, in respect of which the week-end reports and rumours were far from satisfactory. The position naturally affects Home Rails, and prices were not helped by the poor traffic returns.

The Industrial Market was quiet generally, and prices drooped. Tobaccos, Breweries, and Cottons all showed this tendency. Teas were better, and in some instances appreciable rises took place. Rubbers again benefited by a further rise in the commodity.

There were fewer transactions than usual in the Gas Market. It will be seen that there were two improvements in the quotations, Europeans rising ¼ to 7-8, and Newcastle 4 p.c. preference 1 to 77-78. Ignoring one drop *ex* interest, there were, however, four more important depreciations. Gas Light 4 p.c. preference 1 point; Imperial Continental ordinary 2 points; South Metropolitan ordinary and South Suburban 1 point each. These falls, following on those of the previous week, indicate the general tendency. The Gas Market is not affected to so great an extent as other markets by any general depression, and it is felt that the fall in value is mainly due to the profit expectation being less than the past year by reason of the fall in the values of the residuals. Dividend announcements which will shortly be made are awaited with interest. The East Kent Gas Company are offering 100,000 ordinary shares of £1 each at par.

The following transactions were recorded during the week:

On Monday, Bournemouth "B" 12$\frac{9}{16}$, 12⅝, Continental Union 30½, Croydon sliding-scale 100, 100½, European 7¼, Gas Light and Coke 82, 82¼, 83, 3 p.ct. debenture 58, 58⅛, 59. 59½, Imperial Continental 141, 142, 142½, Montevideo 67¼, 68, Oriental 103½, 104½, Primitiva 9s., 9s. 3d., South Metropolitan 93, 93½, 94, Southampton 5 p.ct. maximum 81⅛, 82.

On Tuesday, Bombay 19s., Cardiff 103½, Continental Union 30, European 7⅜, 7½, Gas Light and Coke 82, 82¼, 82$\frac{1}{16}$, 82⅛, 83, 3½ p.ct. maximum 61½, 4 p.ct. preference 77, 78, 3 p.ct. debenture 58½, 59⅛, 59½, 60, Imperial Continental 140, Primitiva 9s., 9s. 9d., South Metropolitan 92¾, 93.

On Wednesday, Brentford "B" 95, British 4 p.ct. debenture 70⅝ *ex* div., Continental Union 30, 30⅜, Croydon maximum dividend 83, European 7½, Gas Light and Coke 82¼, 82⅜, 3½ p.ct. maximum 61⅜, 4 p.ct. preference 78¼, Imperial Continental 141, Lea Bridge 5 p.ct. 98, Primitiva 9s., 4 p.ct. 1st debentures 79½, 80, South Metropolitan 93, 93⅜, 6½ p.ct. debenture 103½, 104. Supplementary prices, Colombo 7 p.ct. preference 10½, Danish 4 p.ct. debenture 80½, Gas Light and Coke 10 p.ct. Bonds 190, Southend-on-Sea 5 p.ct. new "B" 85, Southgate and District 5 p.ct. debenture 98½, 5 p.ct. preference 89½, 90.

On Thursday, British 4 p.ct. debenture 71⅛ *ex* div., Commercial 3½ p.ct. 84½, 85, Continental Union 30, 30⅜, Gas Light and Coke 3½ p.ct. maximum 62½, Imperial Continental 140½, Lea Bridge 5 p.ct. 97½, 98½, Liverpool 7 p.ct. preference 104, Primitiva 9s. 3d., South Metropolitan 92½, 93, 93½, South Suburban 5 p.ct. 92.

On Friday, British 110½, Gas Light and Coke 82, 82¼, 82⅜, 82¾, Imperial Continental 140, 142, Primitiva 9s. 3d., 4 p.ct. 1st debentures 79$\frac{7}{16}$, 79½, South Metropolitan 92, 93, 6½ p.ct. debenture 103, South Suburban 5 p.ct. debenture 95½ *ex* div. Supplementary prices, Danish 82s. 6d., 85s., Liverpool 5 p.ct. 86, 86⅛.

Notwithstanding the repayment of a fairly large amount to the Bank, Lombard Street was well supplied with loanable credits, and the rate for overnight accommodation ranged from 3½ p.ct. to 3 p.ct., old loans being renewed at the higher rate. Treasury Bills were allotted at the slightly lower average rate of £4 10s. 2·47d.

During the past week striking changes occurred in the Italian exchange, the rate fluctuating up and down from 131 to as high a rate as 146 to the £, the closing quotation being 136⅜ lira. The Paris rate also varied more than usual, and finished slightly against this country at 103.90. The Belgian rate was 104.80; while Sterling on New York, which was steady during the whole week, closed at 4.86⅛.

Silver was quieter, the cash price being 32d. per oz. Gold fetched 84s. 11d. per oz.

The Bank Rate is 5 p.ct., to which it was raised from 4 p.ct. on March 5. Bankers' deposit rates are 3 p.ct. The deposit rates of the discount houses are 3 p.ct. at call and 3½ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. July 3.	Rise + or Fall − on Week.	Transactions Lowest and Highest Prices.
£			%p.a.	%p.a.				
171,978	Stk.	Feb. 5	5	5	Aldershot 5 p.c. max. C.	78—81	..	..
295,492	,,	,,	4	4	Do. 4 p.c. Pref.	71—76	..	..
1,551,868	,,	Apl. 2	6½	6½	Alliance & Dublin Ord.	65—70	..	..
374,000	,,	Jan. 8	4	4	Do. 4 p.c. Deb.	63—68	..	..
300,000	1	May 7	1/7½	1/7½	Bombay, Ltd.	1$\frac{15}{16}$—1$\frac{15}{16}$	..	19/-
170,000	10	Mar. 5	8½	8½	Bournemouth 5 p.c.	12—13	..	..
425,050	10	,,	7	7	Do. B 7 p.c.	12½—12¾	..	12$\frac{9}{16}$—12⅝
150,000	10	,,	6	6	Do. Pref. 6 p.c.	11—12	..	..
50,000	Stk.	June 25	3	3	Do. 3 p.c. Deb.	55—58*	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	76—79*	..	..
992,045	,,	Mar. 5	6$\frac{1}{16}$	6$\frac{1}{16}$	Brentford A Con.	95—100	..	..
990,500	,,	,,	6⅛	6⅛	Do. B New	93—100	..	95
76,000	,,	,,	5	5	Do. 5 p.c. Pref.	95—98	..	..
306,690	,,	June 11	4	4	Do. 4 p.c. Deb.	75—80	..	..
181,337	,,	,,	6	6	Do. 6 p.c. Rich. Red. Deb.	100—105	..	..
214,740	,,	Mar. 5	11½	12½	Brighton & Hove Orig.	165—170	..	..
244,200	,,	,,	8½	9½	Do. A Ord.	122—125	..	..
1,287,500	,,	Feb. 19	5	5	Bristol 5 p.c. max.	96½—97½*a*	..	..
855,000	,,	Mar. 19	8	7	British Ord.	109—114	..	110½
100,000	,,	June 25	7	7	Do. 7 p.c. Pref.	120—125*	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	70—75*	..	70½—71½
100,000	10	May 21	6	8	Cape Town, Ltd.	6¼—7¼	..	..
100,000	10	Apl. 23	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	June 25	4½	4½	Do. 4½ p.c. Deb.	69—74*	..	..
626,860	,,	Feb. 19	6	6	Cardiff Con. Ord.	101—104	..	103½
237,860	,,	June 25	7½	7½	Do. 7½ p.c. Red. Deb.	101—104*	..	..
157,150	,,	Feb. 19	5	6½	Chester 5 p.c. Ord.	89½—94½*b*	..	..
1,513,280	,,	Mar. 5	6	5/14/8	Commercial 4 p.c. Cap.	85—88	..	..
360,000	,,	,,	6	5⅞	Do. 3½ p.c. Cap.	84—87	..	84½—85
475,000	,,	June 11	3	3	Do. 3 p.c. Deb.	56—59	..	..
800,000	,,	14 Jan. 15	—	—	Continental Union, Ltd.	30—35	..	30—30⅜
200,000	,,	June 11	7	7	Do. 7 p.c. Pref.	85—89	..	..
660,000	,,	Mar. 5	6½	6½	Croydon sliding scale	98—102	..	100—100½
284,975	,,	,,	5	5	Do. max. div.	83—86	..	83
492,270	,,	Feb. 19	6	9	Derby Con.	110—112*c*	..	..
55,000	,,	Jan. 8	4	4	Do. Deb.	74—76*c*	..	..
1,002,180	1	Jan. 22	6	4	European, Ltd.	7—8	+¼	7¼—7⅝
16,460,070	Stk	Feb. 19	5½	5½	Gas Light & Coke 4 p.c. Ord.	82—84	..	82—83
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	61—64	..	61½—62½
4,062,235	,,	,,	4	4	Do. 4 p.c. Con. Pref.	77—79	−1	77—78½
4,761,930	,,	June 11	3	3	Do. 3 p.c. Con. Deb.	58—61	..	58—60
130,000	,,	—	10	10	Do. 10 p.c. Bonds	..	..	190
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Mar. 19	6½	6½	Hastings & St. L. 5 p.c. Conv.	92—97	..	..
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	73—78	..	..
70,000	10	May 7	10	10	Hongkong & China, Ltd.	17—18	..	..
86,600	Stk.	Mar. 5	10	10	Hornsey 7 p.c.	136—141	..	..
1,976,000	,,	May 21	10	59	Imperial Continental Cap.	138—143	−3	140—142½
263,950	,,	Feb. 5	3½	3½	Do. 3½ p.c. Red. Deb.	71—74	..	..
235,242	,,	Mar. 19	6½	6½	Lea Bridge 5 p.c. Ord.	96—101	..	97½—98½
2,127,340	,,	Feb. 19	5½	5½	Liverpool 5 p.c. Ord.	86—87*b*	..	86—86⅛
600,000	,,	Mar. 19	7	7	Do. 7 p.c. Red. Pref.	103½—104½*b*	..	104
165,736	,,	Feb. 19	9	8	Maidstone 5 p.c. Cap.	122—132	..	..
63,480	,,	June 25	3	3	Do. 3 p.c. Deb.	52—57*	..	..
75,000	5	June 25	5	7	Malta & Mediterranean	4—4½*	..	..
541,920	Stk.	June 11	4	4	Montevideo, Ltd.	65—69	..	67½—68
2,061,315	,,	Mar. 5	5	5	Newcastle & Gateshead Con.	75—77*d*	..	..
300,929	,,	,,	4	4	Do. 4 p.c. Pref.	77—78*d*	+1	..
529,705	,,	June 24	3½	3½	Do. 3½ p.c. Deb.	67—68a*	..	67½
15,000	,,	Mar. 5	11	12	North Middlesex 10 p.c.	..	..	..
75,940	,,	,,	7$\frac{7}{16}$	8⅛	Do. 7 p.c.	..	..	..
300,000	Stk.	May 7	9	7	Oriental, Ltd.	100—105	..	103½—104½
188,120	,,	June 25	7½	7½	Plym'th & Ston'house 5 p.c.	108—113*	..	..
60,000	50	Mar. 5	13	14	Portsea Island B	96—99	..	..
100,000	50	,,	12	13	Do. C	93—98	..	..
2,289,909	1	—	—	—	Primitiva Ord.	8/6—9/6	− -/9	9/- — 9/9
311,100	100	June 2	4	4	Do. 4 p.c. Red. Deb.	78—80	..	79$\frac{7}{16}$—80
600,000	Stk.	Jan. 22	4	4	Do. 4 p.c. Red. Deb. 1911	64—66	..	..
220,335	,,	June 25	4	4	Do. B. Aires 4 p.c. Rd. Db.	63—65*	..	..
321,670	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	63—65*	..	..
150,000	10	Mar. 19	6	6	San Paulo 6 p.c. Pref.	7½—8¼	..	..
125,000	50	July 1	5	5	Do. 5 p.c. Red. Deb.	42—45*	−1	..
270,000	Stk.	Mar. 19	5½	5½	Sheffield A	104—106*e*	..	..
419,968	,,	,,	5½	5½	Do. B	104—106*e*	..	..
1,047,000	,,	,,	5½	5½	Do. C	104—106*e*	..	..
90,000	10	June 11	6	4	South African	7—9	..	..
6,609,895	Stk.	Feb 19	5	6½	South Met. Ord.	91½—93½	−1	92—94
1,895,445	,,	Jan. 8	3	3	Do. 3 p.c. Deb.	58—61	..	..
734,000	,,	Mar. 5	6½	6½	Do. 6½ p.c. Red. Deb.	102½—104½	..	103—104
91,500	,,	Mar. 5	8½	8½	South Shields Con.	135—136*d*	..	..
1,187,795	,,	Feb. 19	6½	6½	South Suburban Ord. 5 p.c.	92—95	−1	92
368,837	,,	June 25	5	5	Do. 5 p.c. Deb.	95—98*	..	95½
647,740	,,	May 7	5	5	South'mpt'n Ord. 5 p.c. max.	80—83	..	81½—82
121,275	,,	June 25	4	4	Do. 4 p.c. Deb.	70—75*	..	..
250,000	,,	Mar. 5	7	7	Swansea 7 p.c. Red. Pref.	102—104	..	..
200,000	,,	June 25	6½	6½	Do. 6½ p.c. Red. Deb.	100—102*	..	..
120,000	,,	Feb. 19	8	8	Tottenham District A 5 p.c.	116—119	..	..
882,275	,,	,,	6½	6½	Do. B 3½ p.c.	93—98	..	..
150,000	,,	—	—	—	Do. 5½ p.c. Pref.	103—105	..	..
181,255	,,	June 11	4	4	Do. 4 p.c. Deb.	76—79	..	..
258,251	,,	Mar. 19	5	5	Tynemouth Con. and New Uxbridge, Maidenhead, & Wycombe 5 p.c.	74—76*d*	..	..
197,294	,,	Feb. 19	6½	6½	Do. 5 p.c. pref.	95—100	..	..
88,330	,,	,,	5	5	Do. 5 p.c. Maidenh'd	95—100	..	..
91,800	,,	,,	—	6½	Wandsworth, Wimbledon, and Epsom—	90—95	..	..
30,000	,,	Mar. 5	9½	9½	Wandsworth A 5 p.c.	130—135	..	..
255,636	,,	,,	7½	7½	Do. B 3½ p.ct.	110—115	..	..
392,955	,,	,,	6/9/6	6/9/6	Do. C and New	95—100	..	..
352,000	,,	,,	7½	7½	Wimbledon 5 p.ct.	105—110	..	..
98,000	,,	,,	7½	7½	Epsom 5 p.ct.	112—117	..	..
88,416	,,	June 25	3	3	3 p.c. Deb.	55—58*	..	..

Quotations at:—*a*,—Bristol; *b*,—Liverpool; *c*,—Nottingham. *d*,—Newcastle. *e*.—Sheffield. * Ex. div.

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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *July* 6.

There is not much of interest to report in the tar products market, and prices generally remain unchanged. The demand for road tar, however, continues; sellers concentrating their efforts at the present time on delivery of that product.

Tar Products in the Provinces.

July 6.

The markets for tar products still remain very quiet, and although buyers will not advance their ideas, sellers, feeling that possibly there may be a coal stoppage which will result in a diminution in the production of tar, are not at all inclined to commit themselves at to-day's low figures for forward delivery.

In pitch, Continental consumers are still trying to purchase at prices below those quoted to-day; but it is doubtful whether they will meet with any success.

Creosote is quiet; but there are indications that there may be an improvement in price with the Continental and American buyers coming into the markets for the latter end of the year.

Water white products are quiet, with a fair demand. Carbolic is still neglected, and naphthalene is practically unsaleable.

The average values for gas-works products during last week were: Gas-works coal-tar, 26s. to 31s. Pitch, East Coast, 39s. to 40s. f.o.b. West Coast—Manchester, 34s. to 35s.; Liverpool, 35s. to 36s.; Clyde, 38s. to 39s.; Benzole, 90 p.ct., North, 1s. 7½d. to 1s. 8½d.; crude, 65 p.ct. at 120° C., 1s. to 1s. 1d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 7½d. to 1s. 8½d. Toluole, naked, North, 1s. 6½d. to 1s. 7½d., nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8½d. Solvent naphtha, naked, North, 1s. 4d. to 1s. 5d. Heavy naphtha, North, 1s. to 1s. 2d. Creosote, in bulk, North liquid, 5⅜d. to 6d.; salty, 5⅝d. to 5⅞d.; Scotland, 5½d. to 5⅝d. Heavy oils, in bulk, North, 6½d. to 7d. Carbolic acid, 1s. 5d. to 1s 6d. prompt. Naphthalene, £11 to £14; salts, £4 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality unsaleable.

CONTRACTS OPEN.

Coal.

Tenders for from 2000 to 2500 tons of coal are invited by the Longridge Gas Company. [See advert. on p. 128.]

Liquor Cooler, Tar Extractor, Washing and Scrubbing Plant.

The Edinburgh Corporation are inviting tenders for the supply and erection, at their Granton Gas-Works, of a liquor cooler, tar extractor, and washing and scrubbing plant. [See advert. on p. 128.]

EXTENSIONS.

New Holder for Stratford-on-Avon.

The Ministry of Health on Wednesday last held an inquiry into an application by the Stratford-on-Avon Town Council for sanction to borrow £15,260 for the provision of a new gasholder.

TRADE NOTES.

Crossley Brothers, Ltd.

Messrs. Crossley Brothers, Ltd., of Openshaw, Manchester, have published two pamphlets dealing with heavy oil engines. One of these publications is a detailed report of a test carried out by Mr. W. A. Tookey on two Crossley engines driving pumps at the Woodmansterne Pumping Station.

Woodall-Duckham Refuse Destructor.

The Metropolitan Borough of Marylebone, on the recommendation of the Highways Engineer (Mr. James Gair, Assoc.M.Inst.C.E.), have placed an order with the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., for a refuse destructor. This will be the first plant of its kind in this country, though there are a number of successful installations on the Continent. The destructor will be a full-sized demonstration unit, and will consist of one combustion cell, one Stirling boiler, band conveyor, elevators, blowers, &c. The residue from the plant will be in the form of hard clinker, suitable as a basis for building materials. The plant will be capable of dealing with 20 to 24 tons of town's refuse per day; and the heat generated from this quantity of refuse will be capable of producing 200 to 225 KW. per hour.

Wolverhampton Capital Issue.—The recent issue by the Wolverhampton Gas Company of £50,000 of 6 p.ct. irredeemable preference stock was considerably over-subscribed, and many applicants were unsuccessful in obtaining the full amount applied for.

Tamworth Gas Company's Order.—The Tamworth Town Council have decided to offer no objection to the application of the Tamworth Gas Light and Coke Company to the Board of Trade for a Special Order empowering them to purchase the undertaking of the Fazeley Gas Company, Ltd.

Leeds Gas Department.—At a recent meeting of the Gas Committee the City Treasurer submitted a statement of accounts of the gas undertaking for the year ended March 31 showing, subject to audit, a gross profit of £140,065, which, after payment of loan charges and income-tax, left a deficit of £29,520.

The Cork Gas Consumers' Company recently organized a competition in gas cooking among the schools of the neighbourhood. Nearly £100 was distributed in prizes; the names of the winning competitors being published in the "Cork Examiner" for Monday last.

The proprietors of the Liskeard Gas Company, on Thursday last, confirmed a resolution to convert the Company into a limited liability company, with a view to developing the supply of electricity. It was hoped the installation of plant would be sufficiently advanced to enable current to be supplied during the coming autumn.

A Sub-Committee of the Tipton Urban District Council Gas Committee have had under consideration the present agreement with the Rowley Regis and Blackheath Gas Company, dated August, 1920, and have recommended that a further agreement be entered into for a period of three years, at a flat rate of supply of 2s. 6d. per 1000 c.ft. They intimate that a condition of this concession be that an approximate reduction in the price of gas supplied to manufacturers in the Tividale area be made by the Company.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON TUESDAY, to ensure insertion in the following day's issue.

Orders to Alter or Stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Monday.

UNDISPLAYED ADVERTISEMENTS; Situations Wanted, Six Lines and under (about 36 words), 3s.; each additional Line, 6d. Situations Vacant, Apparatus Wanted and for Sale, Contracts, Public Notices, &c., 9d. per Line—minimum, 4s. 6d.

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Resists 4500° Fahr. Best for Gas-Works.
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See Advertisement, p. 84.

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Tins for Sale to Consumers.
In Bulk for Works Use.
(*See "The Gas Salesman," p. 122*).
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33, St. Mary at Hill, London, E.C.3.
Phone: Royal 1484.

A Copy of this Prospectus has been Filed with the Registrar of Joint Stock Companies.

The Special Permission of the Committee of the Stock Exchange to deal in the Shares now offered will be applied for.

The Subscription List will be Closed on or before the 10th day of July, 1925.

THE EAST KENT GAS COMPANY, LTD.

(Incorporated under the Companies Acts, 1908 to 1917; Parliamentary Powers under East Kent Gas Order, 1923.)

SHARE CAPITAL.

Authorized.	Issued and Fully Paid (excluding present issue).
350,000 Shares of £1 each ...	**... £71,479**

ISSUE OF
100,000 SHARES OF £1 EACH AT PAR.

PAYABLE AS FOLLOWS:

2/- per Share on Application; 8/- per Share on Allotment; 10/- per Share one month after Allotment.

No part of this issue has been, or will be, underwritten, but the Directors will proceed to allotment on a minimum subscription of 40,000 Shares of £1 each. Subscription of this amount has been guaranteed by the Directors personally, free of any underwriting or other commission.

DIRECTORS:

HENRY GANN, J.P., Dunkirk House, Boughton, Kent.
Chairman, The Whitstable Gas and Coke Company, Ltd.
Managing Director, Seasalter and Ham Oyster Fishery Company, Ltd.

GEORGE EVETTS, M.Inst.C.E., M.Cons.E., Palace Chambers, Westminster, S.W.
Consulting Gas Engineer.

FRED STANLEY GANN, "Ferrodene," Whitstable, Kent.
Director, The Whitstable Gas and Coke Company, Ltd.

ROBERT BRUCE REEVES, 22, High Street, Whitstable, Kent.
Managing Director, The Whitstable Gas and Coke Company, Ltd.

BANKERS:

LLOYDS BANK LIMITED, High Street, Whitstable, and 72, Lombard Street, London, E.C. 3.

SOLICITORS.—SPEECHLY, MUMFORD & CRAIG, 10, New Square, Lincoln's Inn, W.C. 2.

AUDITORS.—CASH, STONE & CO., 90, Cannon Street, E.C. 4.

ENGINEER.—THOS. H. REECE, A.M.I.Mech.E., 15, London Road, Deal, Kent.

SECRETARY AND REGISTERED OFFICE:
O. ASHBY, 22, High Street, Whitstable, Kent.

PROSPECTUS.

The East Kent Gas Company, Ltd., was formed for the purpose, *inter alia*, of carrying on and developing the undertaking authorized and powers conferred by the East Kent Gas Order, 1923. This Order confers the statutory right to supply gas over a territory of about 200 square miles in East Kent, comprising a population estimated at over 100,000. In addition to the rights and powers of supplying gas to individual consumers for lighting, heating, and power, statutory authority is given to supply in bulk to existing undertakers and to lay trunk mains through the areas of supply of existing companies.

The Company proposes to develop the gas supply in the more important towns in its statutory area, and has already begun the laying of mains; when the system of mains at present in hand is completed it will form the most extensive high-pressure gas supply scheme in this country.

The Company has acquired 93½ per cent. of the issued share capital of the Whitstable Gas and Coke Company, Ltd., at a cost of £67,860, of which £44,110 has been satisfied by the allotment of fully-paid shares in the Company. The revenue of the Whitstable Company for the year ended 30th June, 1924, amounted to £21,130 5s. 9d., the net profit, after payment of Income-Tax and Corporation Profits Tax, for the same period being £5500 9s. 11d. The net profit of the Whitstable Company for the half-year ended 31st December last was £3606 10s. 6d., or at the rate of £7213 per annum, which is more than sufficient to pay the full statutory dividend of 10 per cent. on the shares already issued, subject to reasonable depreciation.

The Company has also purchased the whole of the issued capital, amounting to £2100, of the Wye Lighting, Heating, and Power Company, Ltd., for the sum of £1050. It is believed that this Company, which is trading at a small profit, can be made into a substantial revenue producer when manufacture ceases at the existing gas-works, and a supply is afforded from the high-pressure mains. Negotiations for the purchase outright of other works adjoining the area are also in hand.

The Directors estimate that from the arrangements already concluded in connection with the existing scheme an annual sale of more than 50,000,000 cubic feet (exclusive of bulk supplies) may be confidently anticipated.

The high-pressure system of supply which the Company has adopted enables the service mains in the villages and hamlets to be fed at adequate pressure through reducing governors, and at the same time enables isolated farmers and other consumers to be supplied through service governors, and thereby affords a supply for light, heat, and power purposes to a population to whom a supply under ordinary conditions could never be available.

Considerable developments are likely in the near future in the colliery districts of East Kent, the whole of which are contained in the Company's area of supply.

The high-pressure mains are being laid with such a margin of capacity that considerable increases in business can be dealt with without further capital expenditure in mains.

The capital now offered is required (*a*) to discharge the temporary bank overdraft by which the Company has financed its requirements in connection with the purchase of the shares of the Whitstable Gas and Coke Company, Ltd., laying the mains above referred to, and the purchase of the share capital of the Wye undertaking; (*b*) for completing the mains, and providing compressing and other plant, meters, stoves, and fittings; and (*c*) for the general work of the Company.

The principal assets of the Company, exclusive of the proceeds of the present issue, are:—

Shares in Whitstable Gas and Coke Company, Ltd., at cost, £67,860; Parliamentary Order granting Statutory Rights over the East Kent Area, £8674; Land, &c., at cost, £500; Shares in Wye Company, Ltd., at cost, £1050; Other initial capital expenditure on additional registration duties, detailed surveys, plans, and estimates, compensation to outgoing Directors of the Whitstable Company, &c., amount to £20,715	£98,799

The only liability of the Company, exclusive of the costs of this issue and current expenses, is the Bank Overdraft of £27,170.

The Directors estimate the following as the capital expenditure involved in the carrying out of the plans as outlined above:—

Compressors and connections, £1500; Mains and trenching machines, £49,100; Services, reducing governors and pits, and house governors, £5100; Ordinary and pre-payment meters, £6500; Coin meter installations, *less* contributions, £3000; Cookers, £4050	£69,250

Sale of 51,500,000 cubic feet of gas in the East Kent area, meter rents, and the Estimated Revenue on the basis of such plans is:—

Sundries	£17,780	
Less Cost of gas, rates, management, &c.	11,030	
Profit from East Kent area		6,750
Add Dividends on Investment in Whitstable Company (93½ per cent. Whitstable Profits)—		
Maintainable profit in the Whitstable District with Gas at 6s.	£6,500	
Additional profit from 57,000,000 cubic feet to be supplied to the East Kent Gas Company after paying interest on the necessary capital expenditure	1,025	
Total Profit of the Whitstable Company	£7,525	
93½ per cent. of which is		7,037
Total estimated profit		£13,787

This amount is sufficient to meet dividends on the capital issued and now offered, totalling £171,479, at the rate of nearly 8 per cent. per annum.

An ultimate object of the Company is to erect coke ovens plant and to distribute the resultant surplus gas, both to individual consumers and to the existing gas undertakings within the statutory area in bulk. For this purpose a freehold site adjoining one of the collieries in the area as well as the main line of the Southern Railway has been acquired.

Where no allotment is made, the remittance will be returned in full, and where the number of shares allotted is less than the number applied for, the balance of such remittance will be credited in reduction of the remaining payment, and any excess returned to the applicant. Failure to pay at due date the amount payable on allotment and/or the subsequent instalment will render the previous payments liable to forfeiture.

The minimum subscription on which the Directors may proceed to allotment is fixed by the Articles of Association at seven shares, but (as above mentioned) the subscription of £40,000 has been guaranteed, and the Directors will proceed to allotment accordingly.

The following contracts have been entered into:

(1) Agreement dated 9th February, 1925, between the Company and Drew-Bear, Perks & Co., Ltd., under which Drew-Bear, Perks & Co., Ltd., of Battersea Steel Works, Wellington Road, Battersea, were allotted 8313 fully-paid shares of £1 each in the Company for services rendered in connection with surveys, preparation of plans, and estimates for carrying out the statutory undertaking of the Company.

(2) Agreement dated 26th February, 1925, between Mr. W. H. Reeves, of 44, High Street, Whitstable (trustee for the shareholders of the Whitstable Gas and Coke Company, Ltd.), of the one part, and the Company of the other part, under which over 93 per cent. of the shares of the Whitstable Company were purchased on the terms mentioned above.

(3) Agreement dated 10th March, 1925, between the Company and Josiah Reeves, of Poplar Villa, Cromwell Road, Whitstable; Frank Nicholls, of "Burnham," Canterbury Road, Whitstable; Feakins Alfred Johnson, of Millfields, Whitstable; and Henry Laurence Daly, of 1, Gladstone Road, Whitstable, the four retiring Directors of the Whitstable Gas and Coke Company, Ltd., under which each of them was allotted 1000 fully-paid shares of £1 each of the Company as compensation for loss of office.

Copies of the Agreements and Order above referred to and of the Company's Memorandum and Articles of Association can be inspected at the offices of Messrs. Speechly, Mumford & Craig, the Solicitors to the Company, at 10, New Square, Lincoln's Inn, W.C. 2, at any time between the hours of 11 a.m. and 4 p.m. on any day while the subscription list is open.

Application will be made to the Committee of the London Stock Exchange for permission to deal in the shares of the Company.

The Company will pay a brokerage of 3d. per share on all shares allotted in respect of applications bearing the stamp of a Broker, Banker, or Approved Agent.

Applications for shares should be made on the accompanying form and lodged with Lloyds Bank Limited, Whitstable, or 72, Lombard Street, London, E.C. 3, together with the amount payable on application.

Prospectuses and forms of application can be obtained from the Bankers and Solicitors, and from the Registered Office of the Company.

Dated the 2nd day of July, 1925.

THE EAST KENT GAS COMPANY, LIMITED.

(Incorporated under the Companies Acts, 1908 to 1917.)

Issue of 100,000 Shares of £1 each at par

PAYABLE AS FOLLOWS:

2/- per Share on Application
8/- per Share on Allotment
10/- per Share One Month after Allotment

20/-

FORM OF APPLICATION FOR SHARES.

To the East Kent Gas Company, Limited.

Gentlemen,—Having paid to your Bankers the sum of £..... being a deposit of 2s. per share on Application for ..... Shares of £1 each, at par, of the above Company, I/we hereby apply for and request you to allot to me/us that number of Shares in accordance with this application, upon the terms of the Company's prospectus dated the 2nd day of July, 1925, and of the Memorandum and Articles of Association of the Company, and I/we hereby agree to accept the same or any smaller number of such Shares that may be allotted to me/us, and to pay the sum of 8s. per Share on Allotment and the balance as provided by the said prospectus, and I/we hereby authorize you to place my/our name(s) on the Register of Members as the holder(s) of the Shares allotted to me/us.

Yours faithfully,

Please write distinctly.

Usual Signature .....
Name in Full (Block Letters) .....
.....
Address .....
Profession or Occupation .....
(A lady should state whether she is a Spinster, Wife, or Widow.)
Dated.....1925.

State here whether a Shareholder, Customer, or Employee of the East Kent Gas Co., Ltd.

.....

This form to be sent entire, with the deposit of 2s. per Share on the number of Shares applied for, to Lloyds Bank Limited, Whitstable, or 72, Lombard Street, London, E.C. 3.

Cheques should be made payable to Lloyds Bank Limited, or Bearer, and crossed "Not Negotiable." If altered from "Order" to "Bearer" the alteration should be signed by the Drawer.

No receipt will be issued for payment on application, but an acknowledgment will be forwarded in due course, either by allotment letter or return of the deposit.

GEORGE WILSON GAS METERS, Ltd.
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Telephone: RUSHOLME 976. Telegrams: "GASMETER,"
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APPLICATIONS are invited for the Position of ASSISTANT ENGINEER and MANAGER.
Applicants must be thoroughly trained and fully qualified to Take the Entire Control of the Works and District in the absence of the undersigned. They must have specialized in Carbonization—mainly Horizontals, and Carburetted Water Gas, and be experienced in the Construction and Maintenance of Gas-Works Plant, also the Organization and Control of Workmen.
The present make of gas is approximately 800 Million cubic feet per Annum.
Salary, £550 per Annum.
Apply, by letter only, stating Age, Particulars of Training, Experience, and present employment, with *copies* of Two *recent* Testimonials to
JOSEPH WM. BUCKLEY, M.Inst.C.E.,
Engineer and General Manager.
Gas-Works, Hornsey,
London, N 8.

WORKS Superintendent required for 80 Million Works in the South. Mechanically Trained Preferred, with Sound Practical Experience in the Manufacture of Coal Gas, Carburetted Water Gas, Sulphate of Ammonia, and Tar Dehydration. Thoroughly Capable in the Control and Organization of Workmen.
Apply, with References, Stating Age, Experience, and Remuneration required, to No. 7564, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

WANTED, in West Riding, Gasfitters, age 25 to 30, used to Compo and Iron Pipe, Gas Fires, Cookers, Lighting, Heating, &c. Wages, £3 7s. 7d. per week of 47 Hours.
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Condensers.—Water cooled, 500,000 c.ft. per day. 6 in. and 8 in. Pipe Condensers. Also New Patent Baffle Plate Condensers.
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FOR SALE—Three 36 in. Steam Driven Self Balancing CENTRIFUGALS in Good Working Condition. One made by Watson Laidlaw & Co., and the other two by Pott, Cassels, and Williamson.
For full Particulars, apply No. 7567, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

FOUR-TON Saturator for Sulphate of Ammonia FOR SALE. Circular Lead Saturator, "Wilton" type, complete with Cracker Pipes and all Mountings. Practically new.
For full Particulars, apply No. 7566, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

CONTRACTS OPEN.

EDINBURGH CORPORATION.
(GAS DEPARTMENT.)

THE Magistrates and Council invite TENDERS for the Supply and Erection at their Granton Gas-Works of Plant to include LIQUOR COOLER, TAR EXTRACTOR and WASHING and SCRUBBING PLANT capable of dealing with 7,000,000 cubic feet of gas per day of Twenty-four Hours.
Further Particulars may be obtained from the Engineer and Manager, 15, Calton Hill, Edinburgh.
Tenders to be lodged with the Undersigned on or before the 13th of July, 1925, endorsed "Tender for Gas Plant."
The Magistrates and Council do not bind themselves to accept the lowest or any Offer.
ANDREW GRIERSON, S.S.C.,
Town Clerk.
City Chambers,
Edinburgh,
July 1, 1925.

LONGRIDGE GAS COMPANY. LTD.

THE above Company are prepared to receive TENDERS for Well-Screened GAS COAL or Large Well-Screened NUTS. Probable Quantity required, 2000 to 2500 Tons, delivered at the Longridge (L.M & S.) Railway Station, in such Quantities as may be required from July 31, 1925, to Aug. 1, 1926.
Tenders, marked "Coal," to be sent to the Undersigned on or before July 14, 1925.
JAMES LEE,
Secretary.

COMPANY NOTICES.

HORNSEY GAS COMPANY.

NOTICE is Hereby Given that an EXTRAORDINARY GENERAL MEETING of the Proprietors of the Hornsey Gas Company will be held at No. 5, Great Winchester Street, in the County of London, on Friday, the 24th day of July, 1925, at Eleven o'clock in the forenoon precisely, for the purpose of approving an Application to the Board of Trade for a Special Order, under Section 10 of the Gas Regulation Act, 1920, for conferring further powers upon the Company.
By order of the Board,
(Signed) WILLIAM E. ROBERTS,
Secretary.
Secretary's Office,
Gas-Works, Clarendon Road,
Hornsey, N. 8,
July 6, 1925.

LEGAL NOTICE.

1925 H.No. 1542.

IN THE HIGH COURT OF JUSTICE
CHANCERY DIVISION
MR. JUSTICE TOMLIN

IN THE MATTER OF
Letters Patent granted to ALBERT HORSTMANN and OTHERS in respect of inventions entitled respectively,
"Improvement in Timing Device of the kind used in conjunction with Gas Controllers and other Time Switches" and Numbered 32 of 1909
and
"Improvements in Pilot Lights for Gas Burners" and Numbered 23133 of 1909
and
"Improvements in Gas Controllers, Electric Time Switches and other Timing Devices" and Numbered 23161 of 1909
AND
IN THE MATTER OF
The Patents and Designs Acts, 1907 and 1919.

NOTICE is Hereby Given that HORSTMANN GEAR COMPANY LIMITED have by Originating Summons dated the 11th day of May, 1925, applied that the terms of the said Letters Patent may be EXTENDED and that the time for making such application be also EXTENDED, AND NOTICE IS HEREBY GIVEN that on Tuesday, the 13th day of October, 1925, Application will be made to the Court that a day may be fixed before which the said Summons shall not be in the paper for hearing, AND NOTICE IS HEREBY GIVEN that any person desirous of being heard in opposition to the said Summons must, at least seven days before the said 13th day of October, 1925, lodge notice of such opposition at the Chambers of Mr. Justice Tomlin, Room 175, Royal Courts of Justice, Strand, London, and serve a copy thereof upon the above named Applicants.
DATED this 1st day of JULY, 1925.
FREEMAN HAYNES & CO. of 11 Great James Street, Bedford Row, London, W.C. 1, Solicitors for the Applicants, upon whom all documents requiring service may be served.